



Geographic Information System

Vector Data – Part II Lab Practice

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Outline

- **Extract** (Clip/ Select)
- **Overlay** (Union/ Intersect/ Identity/ Erase)
- **Proximity** (Buffer/ Near/ Create Thiessen Polygon)
- **Dissolve**
- **Density** (Point/ Kernel/ Line)
- **Polygon to Line/ Join Features/ Feature to Point**
- **Symbology**



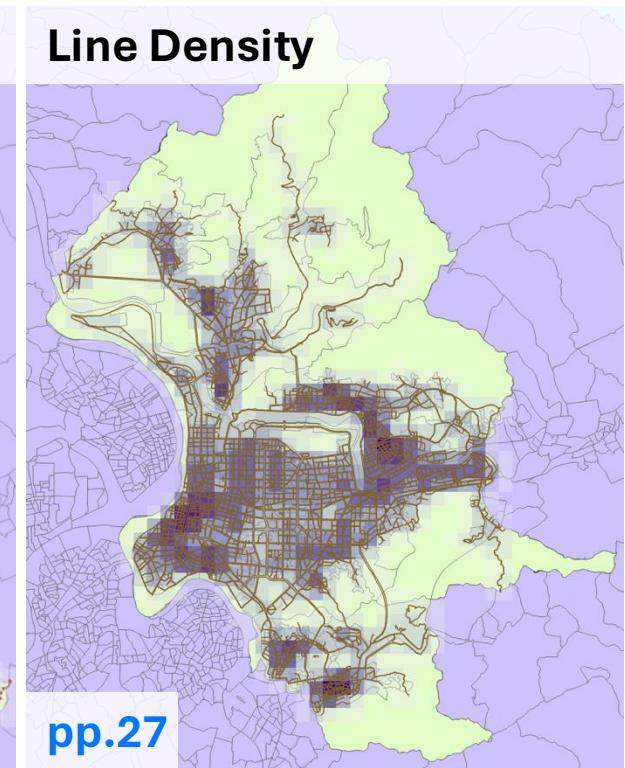
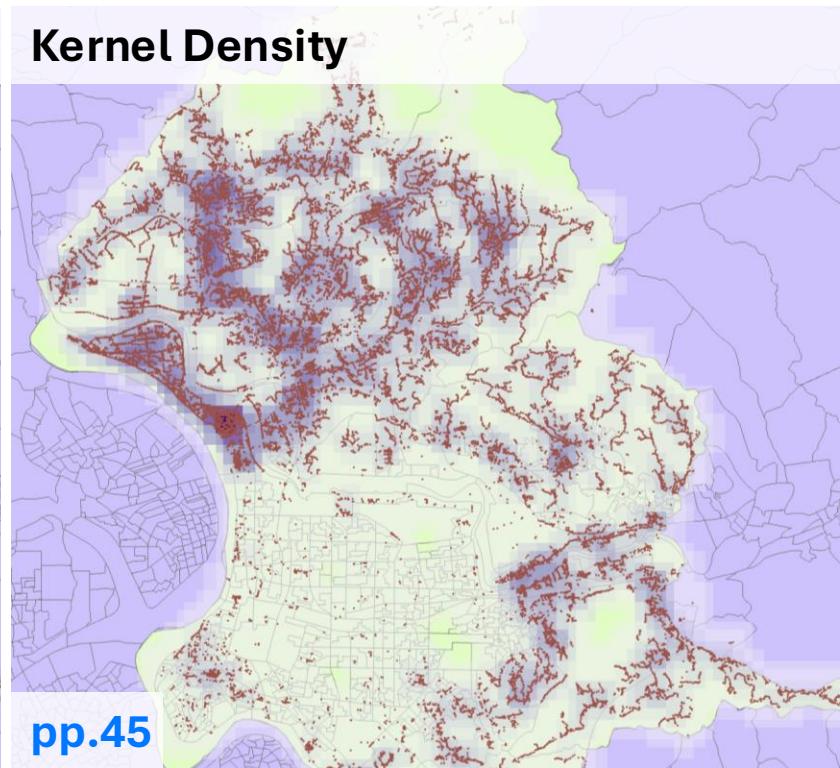
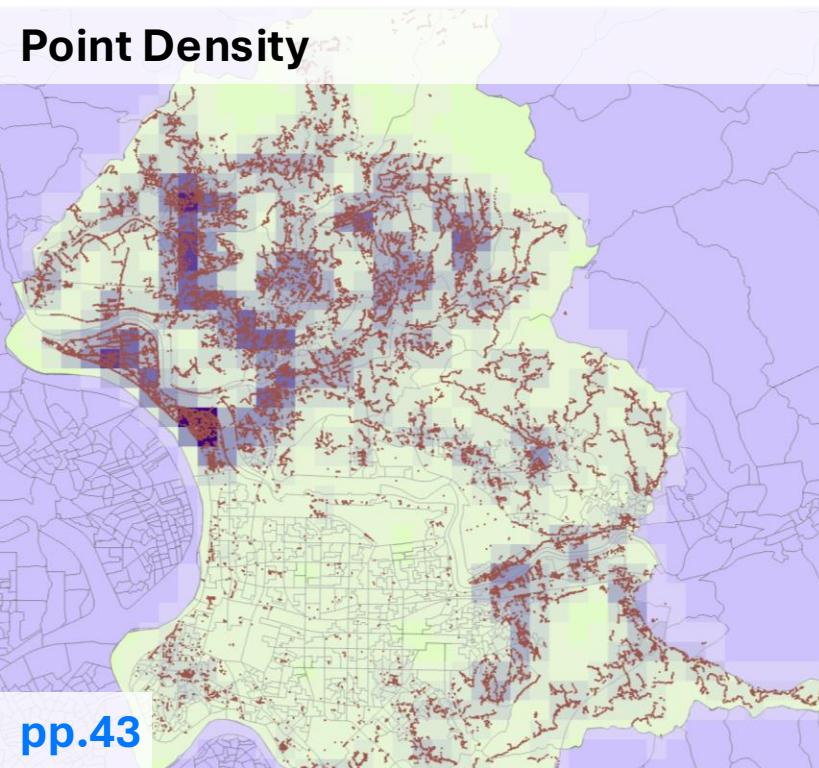
Download Datasets

- [zip] 臺灣電力公司電桿座標及桿號 (utility pole location)
- 臺北市土石流潛勢溪流[\[LINK\]](#) (debris-flow potential rivers)
- 113年6月行政區人口統計_村里_臺北市[\[LINK\]](#) (population by village)
- 臺北市最小統計區圖[\[LINK\]](#) (CODEBASE Layer)
- [8mroadup] 8公尺寬以上的臺北市道路圖[\[LINK\]](#) (Taipei 8m-width road layer)
- 村(里)界(TWD97_121分帶)1130807[\[LINK\]](#) (village boundary)

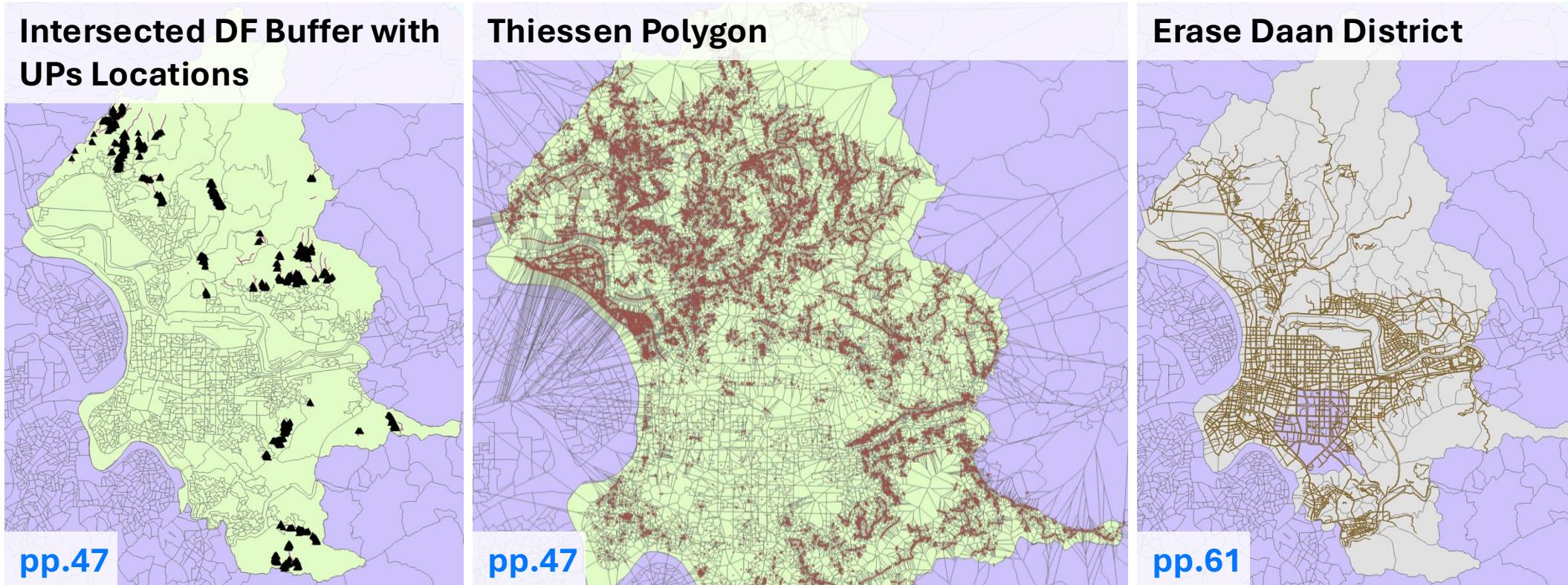
Lab Practice Outcome

Today's visualization Outcome

Lab Practice Outcome



Lab Practice Outcome



Lab Practice Outcome

pp.70

Unique Colors

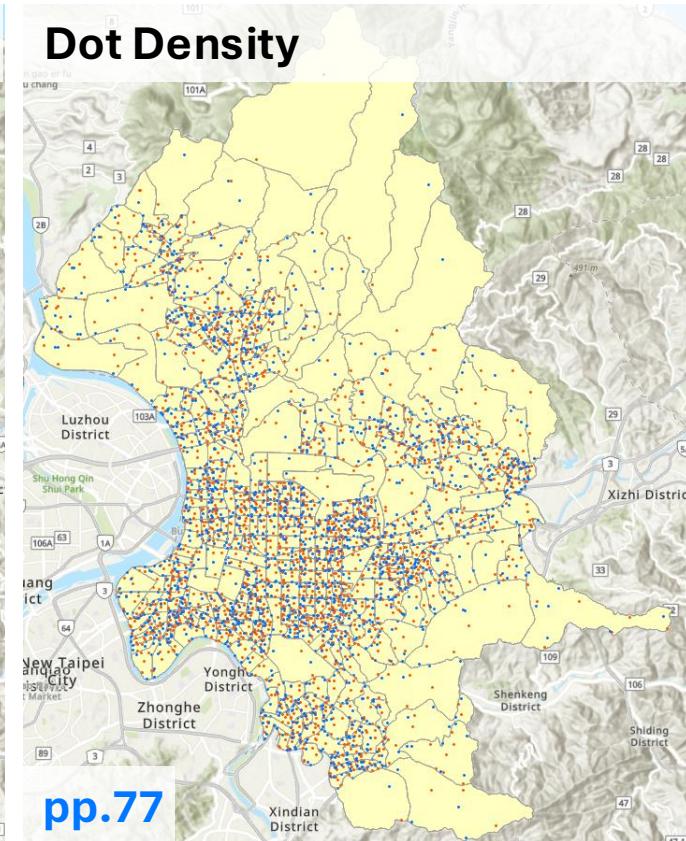
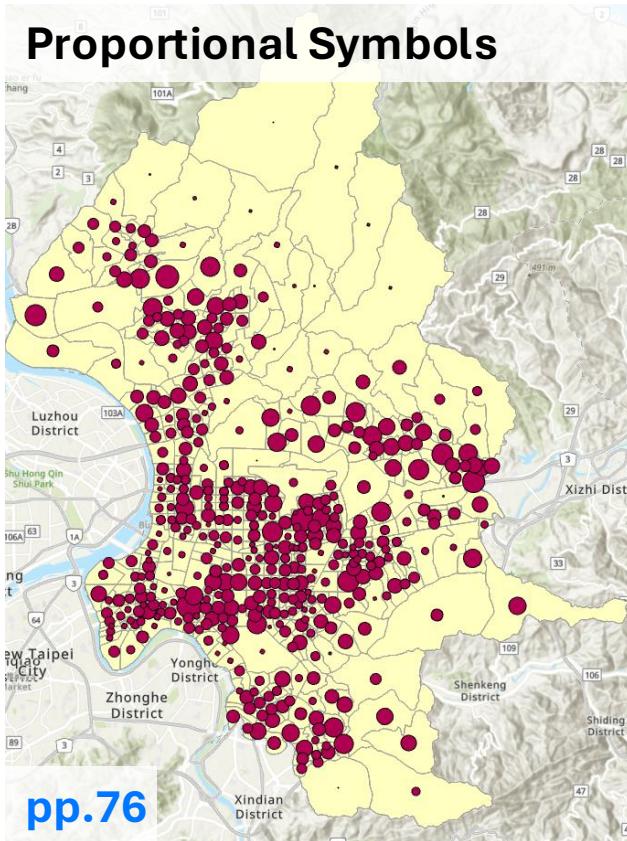
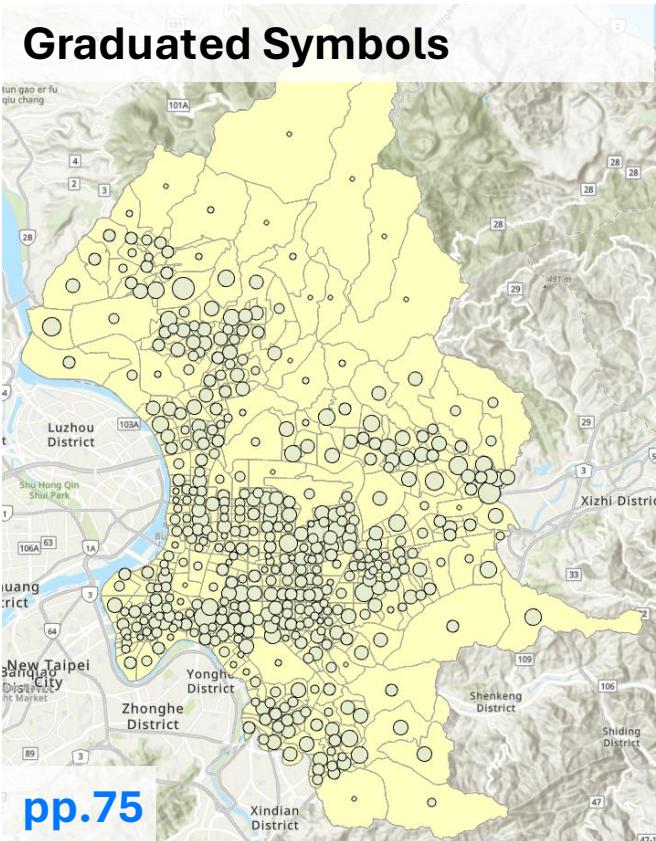
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Graduated Colors

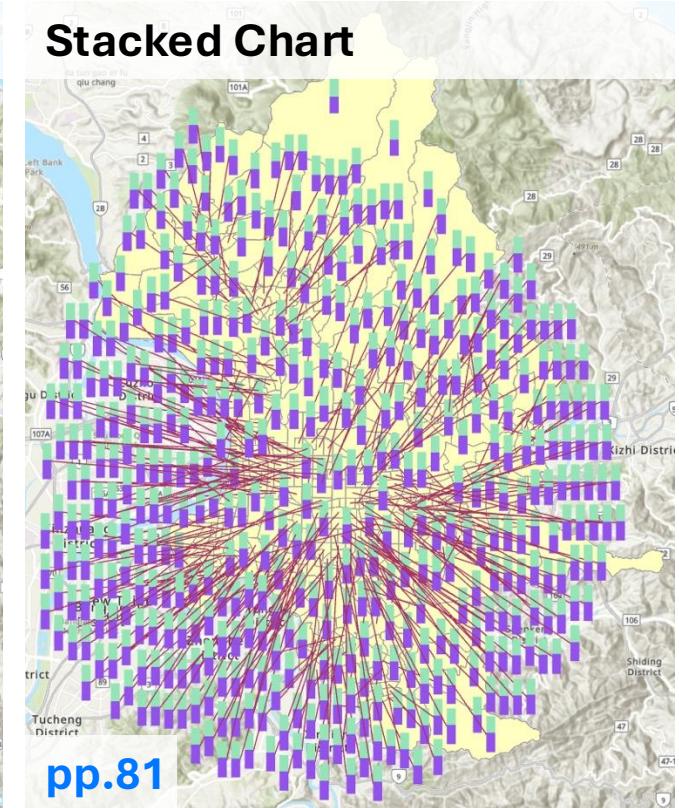
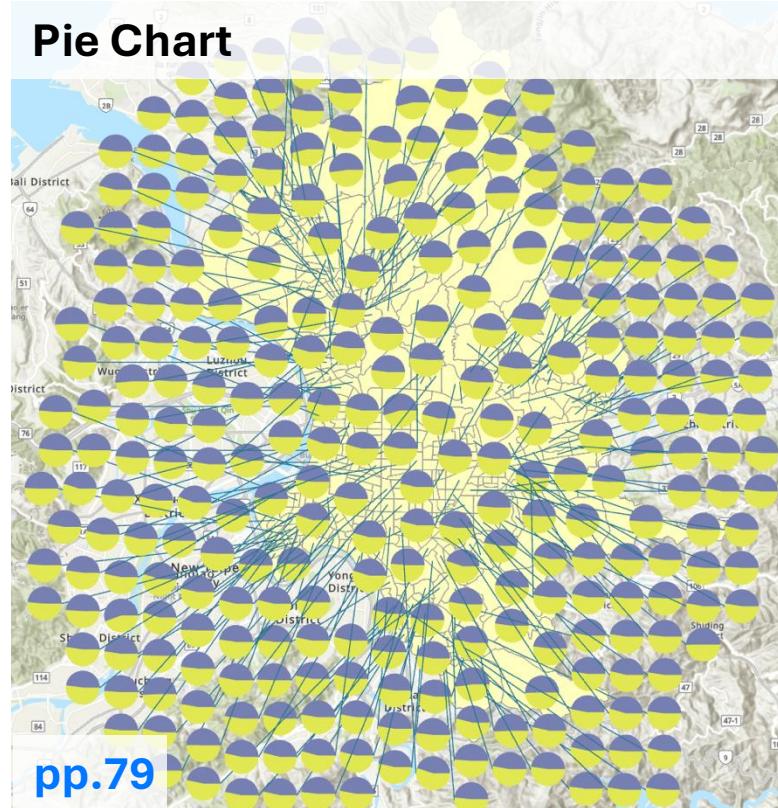
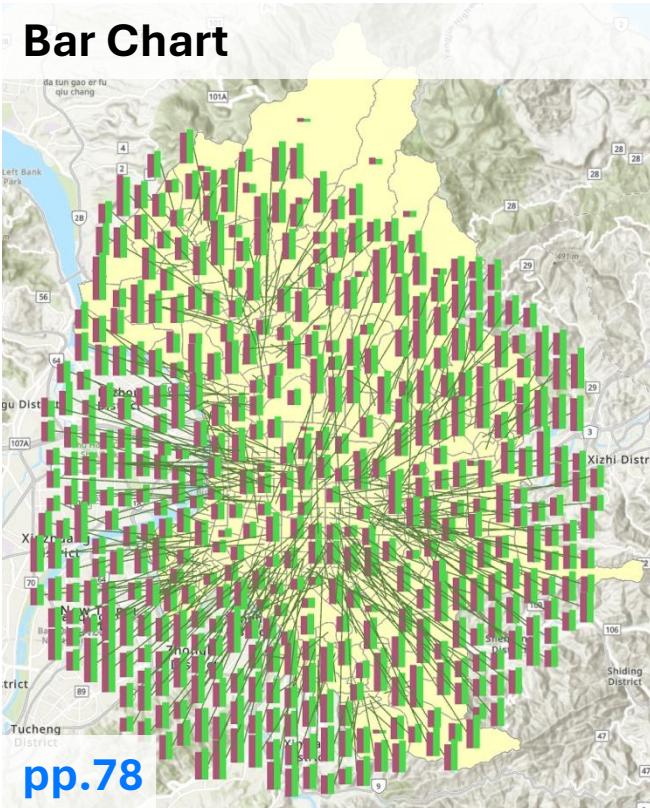
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pp.73

Lab Practice Outcome

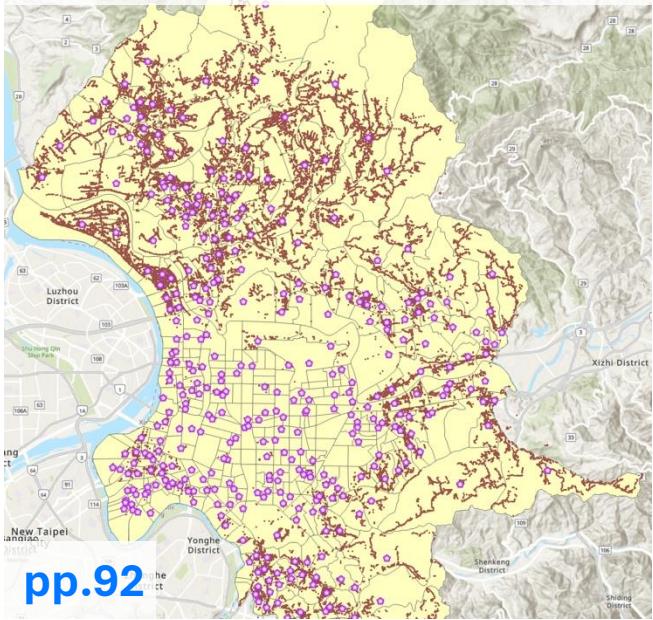


Lab Practice Outcome

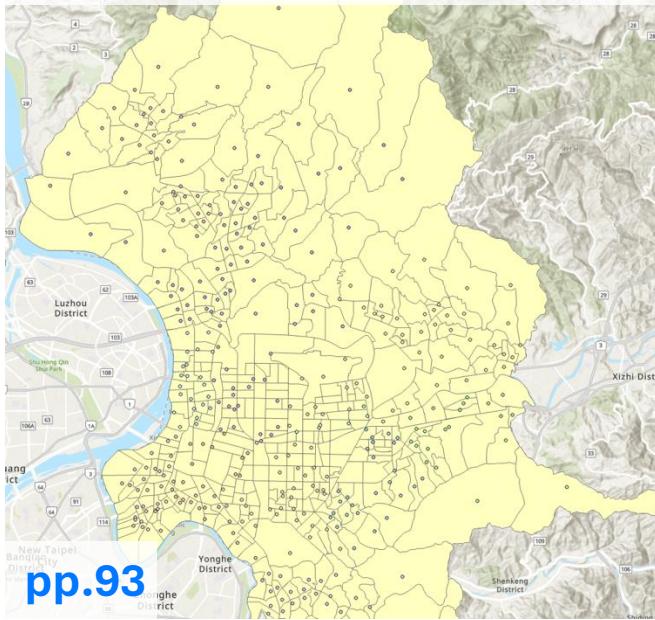


Lab Practice Outcome

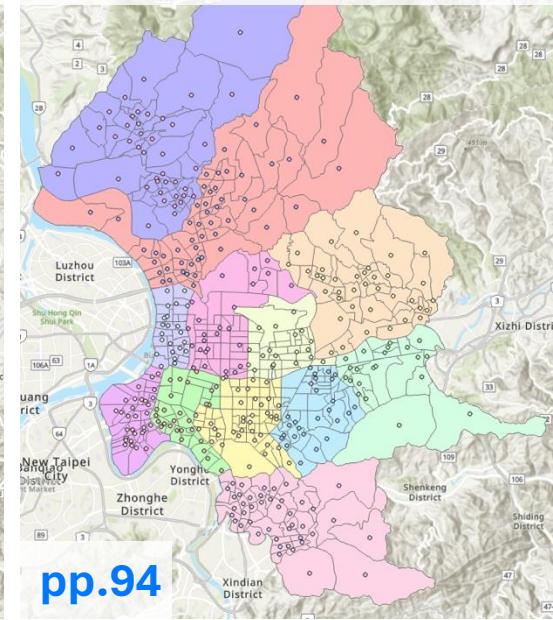
Special Symbols



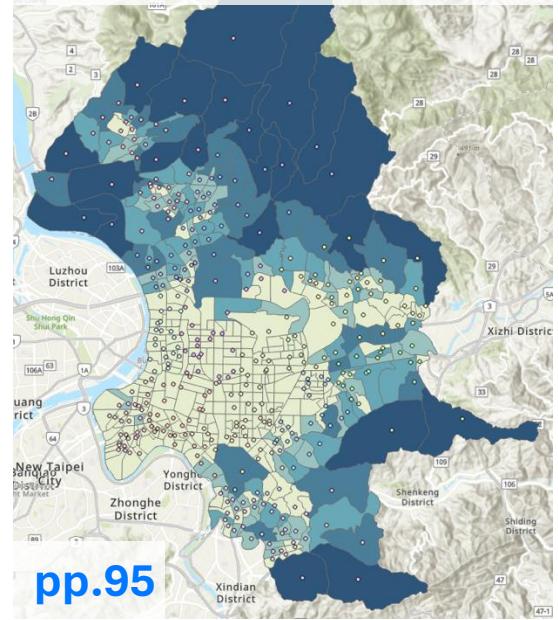
Single Symbol



Unique Values



Graduated Colors



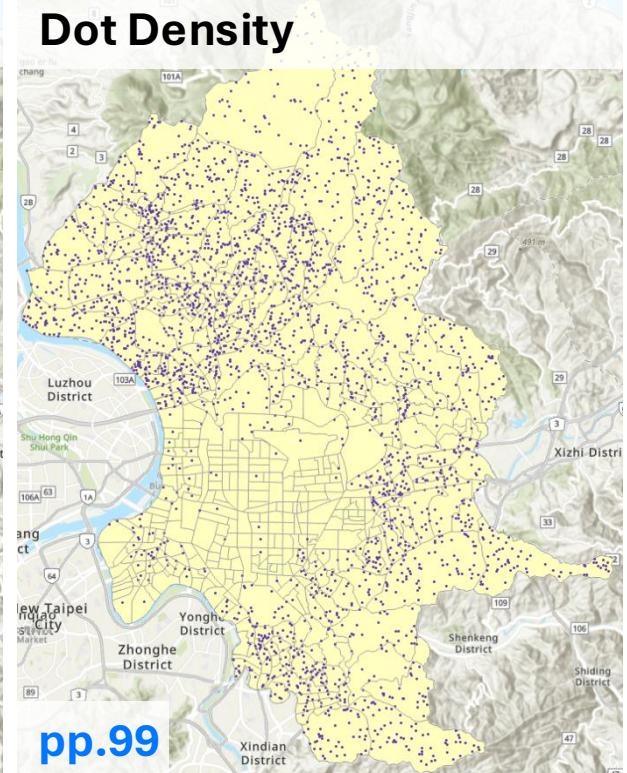
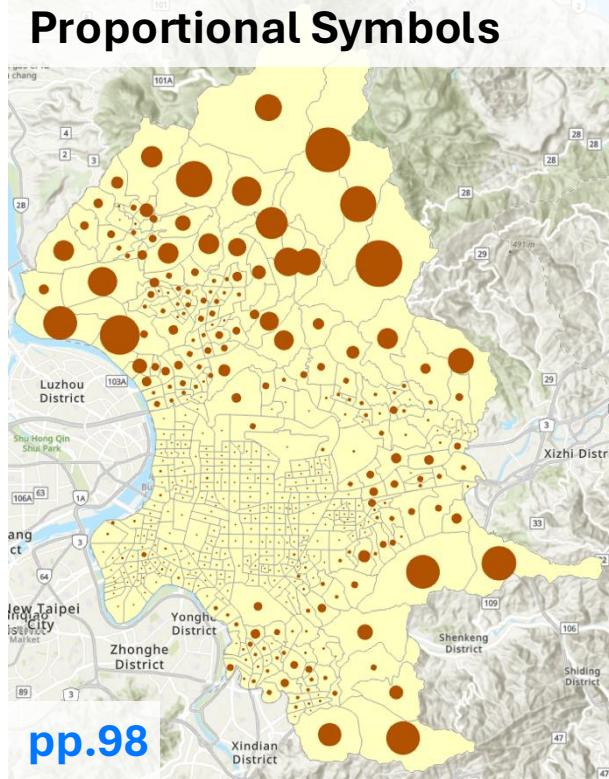
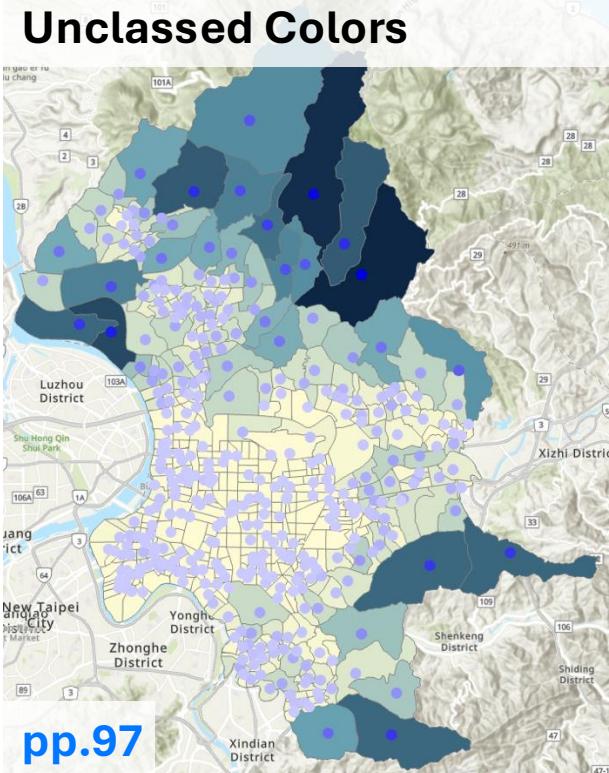
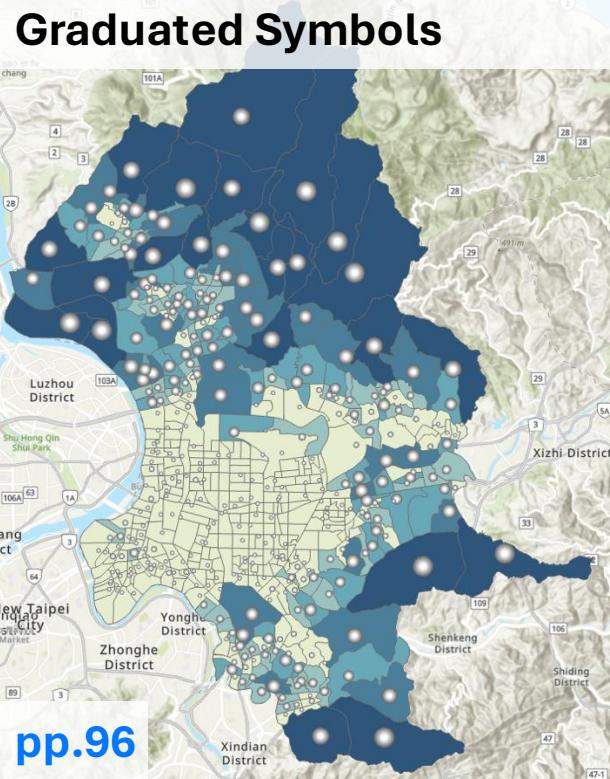
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Lab Practice Outcome



Analysis Procedure

Extract/ Overlay/ Proximity/ Dissolve/ Density

Analysis Procedure

Abbreviation:

1. Debris-flow → DF
2. Utility pole → UP

- 1) Set Map CRS configurations
- 2) KMZ to Shapefile with online tools
- 3) Load all datasets
- 4) Buffer analysis for DF polylines with 100m
- 5) Near analysis for finding the nearest UP from DF polylines
- 6) Near analysis for finding the nearest UP from the 100m buffer area of DF polyline (abbrev. as 100m-DF-buffer)
- 7) Intersect analysis for selecting all UP within the 100m-DF-buffer
- 8) Union analysis for the 100m-DF-buffer
- 9) Dissolve the CODEBASE layer to a CODE2-resolution layer
- 10) Clip CODE2 layer by the 100m-DF-buffer
- 11) Add Field and Calculate Geometry for each DF-CODE2 area
- 12) Join the clipped layer (above) to CODE2 layer by CODE2 ID

Analysis Procedure

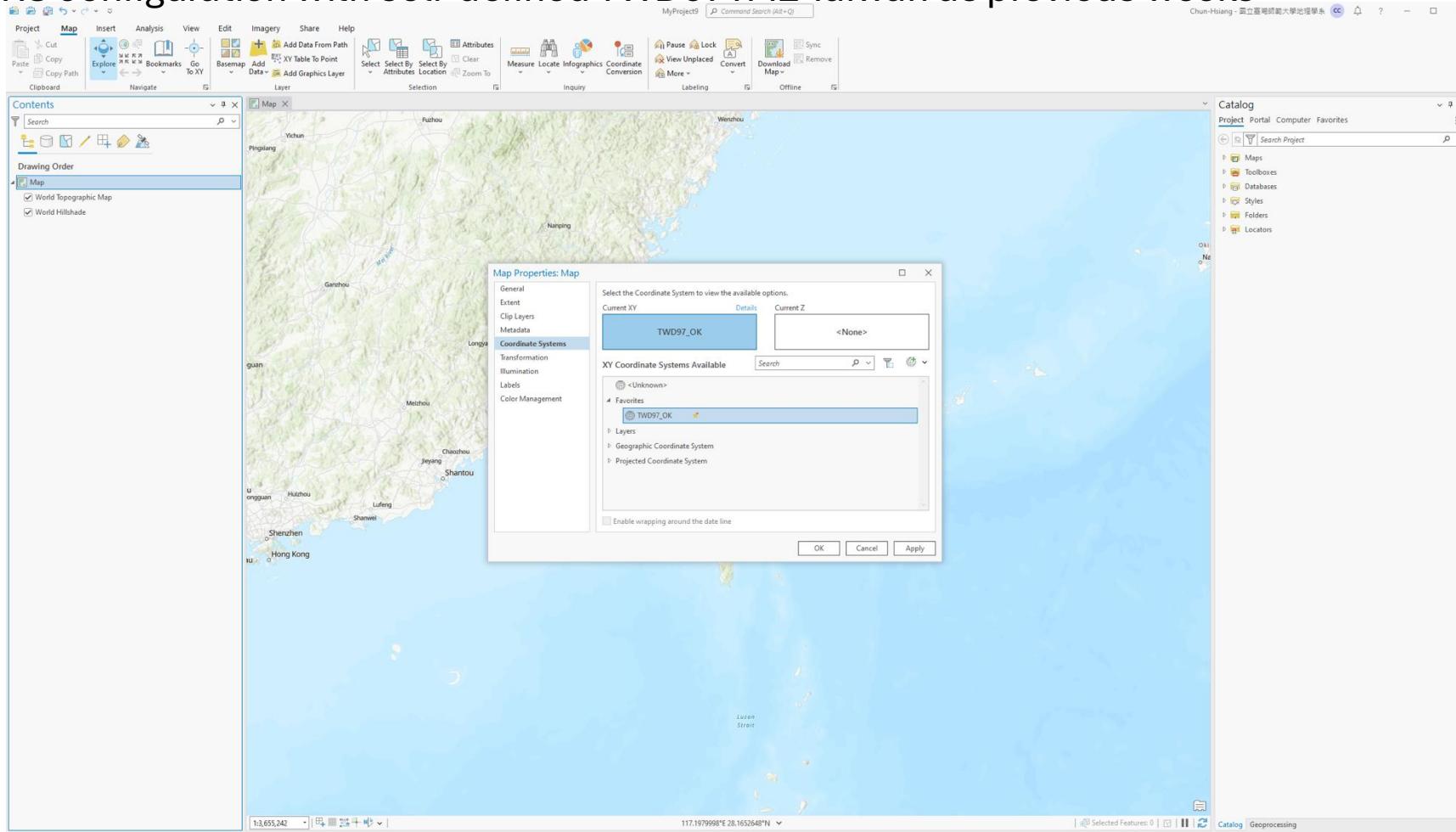
Abbreviation:

1. Debris-flow → DF
2. Utility pole → UP

- 1) Add field and calculate field to compute the proportion of DF-buffer areas
- 2) Find and Replace all <Null> to zeros in the columns of “DFArea” and “Proportion”
- 3) Dissolve by CODE2 and Σ DF Area and proportion
- 4) Point Density for calculating UP density
- 5) Kernel Density for calculating UP density
- 6) Create Thiessen Polygon for UP
- 7) Dissolve road all together by “漏繪”
- 8) Polygon To Line for converting dissolved road into a polyline feature
- 9) Line Density for calculating road density
- 10) Select by Attribute and Export Features to export Daan from Taipei Village layer
- 11) Select by Attribute and Export Features to export Taipei City from Taipei Village layer
- 12) Identify dissolved road by Daan layer
- 13) Erase identified Daan layer by Taipei City layer

Set Map CRS configurations

Set map CRS configuration with self-defined TWD97TM2 Taiwan as previous weeks



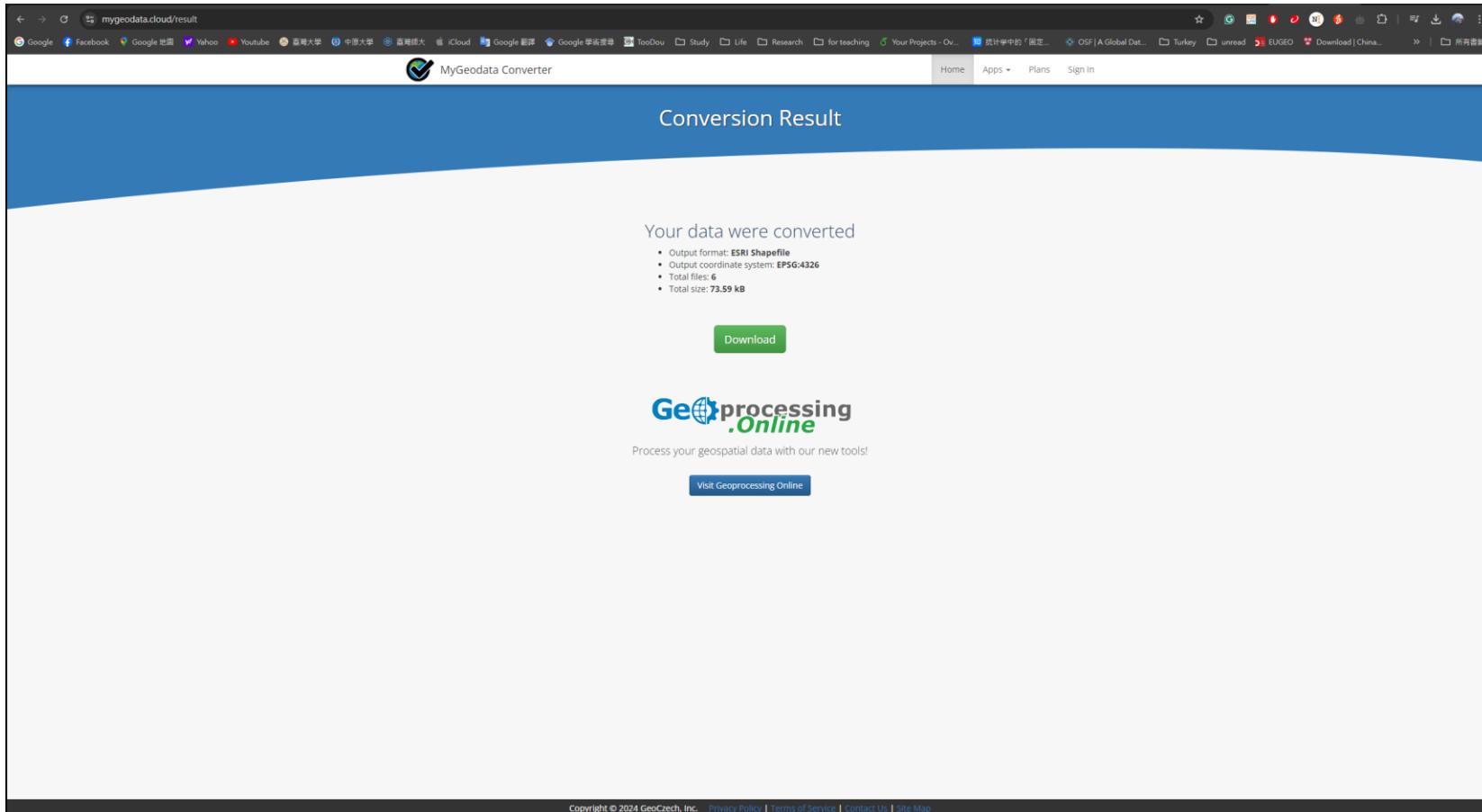
KMZ to Shapefile

Search :: <https://mygeodata.cloud/converter/kml-to-shp>
We convert our uploaded KML/KMZ to ESRI Shapefile

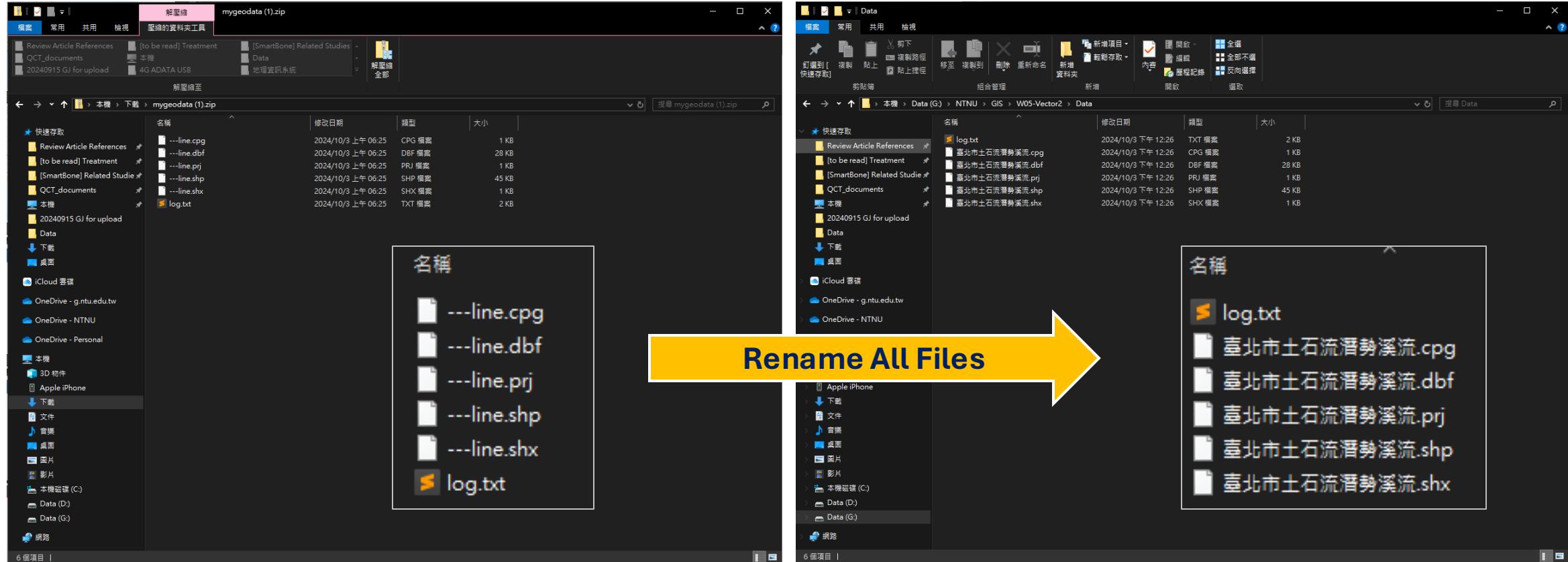
The screenshot shows the 'Convert KML to SHP Online' page. At the top, there's a header bar with the URL 'mygeodata.cloud/converter/kml-to-shp', the 'MyGeodata Converter' logo, and navigation links for 'Home', 'Apps', 'Plans', and 'Sign In'. Below the header is a blue banner with the text 'Convert KML to SHP Online' and 'Enjoy fast and easy to use online converter for geospatial data!'. The main area has two sections: 'Upload your KML File and Convert' (with a 'Drag & Drop files here...' button and a 'Or browse files to convert' link) and 'Conversion from KML to SHP' (with instructions about file formats and coordinate reference systems). A note at the bottom of the upload section states: 'Please note that **your data will not be shared to anybody** unless you do it yourself.' The bottom of the page features a video player titled 'Video: How to Convert KML to SHP' and a sidebar with 'Supported coordinate reference systems'.

KMZ to Shapefile

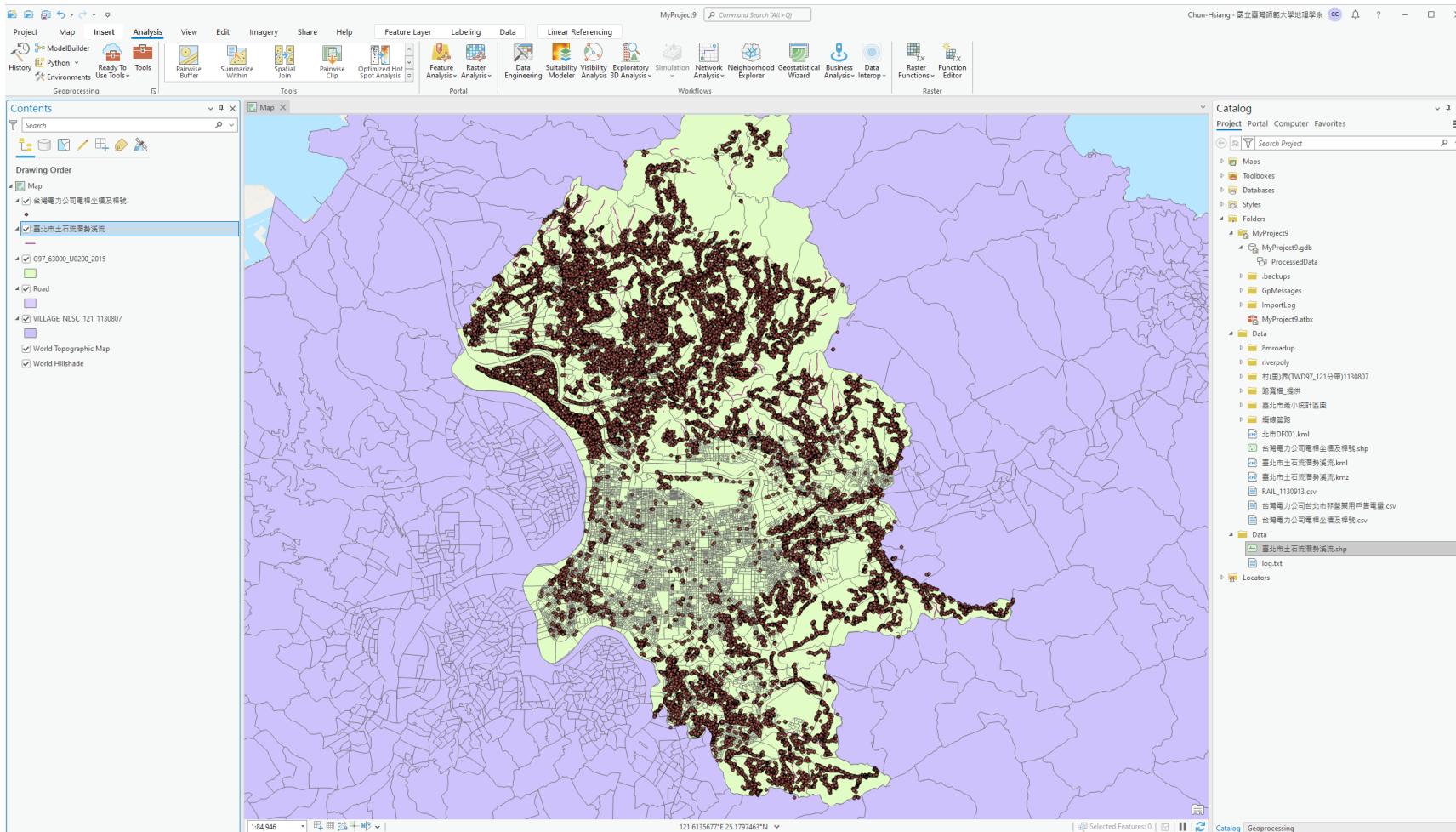
Download the converted ESRI Shapefile



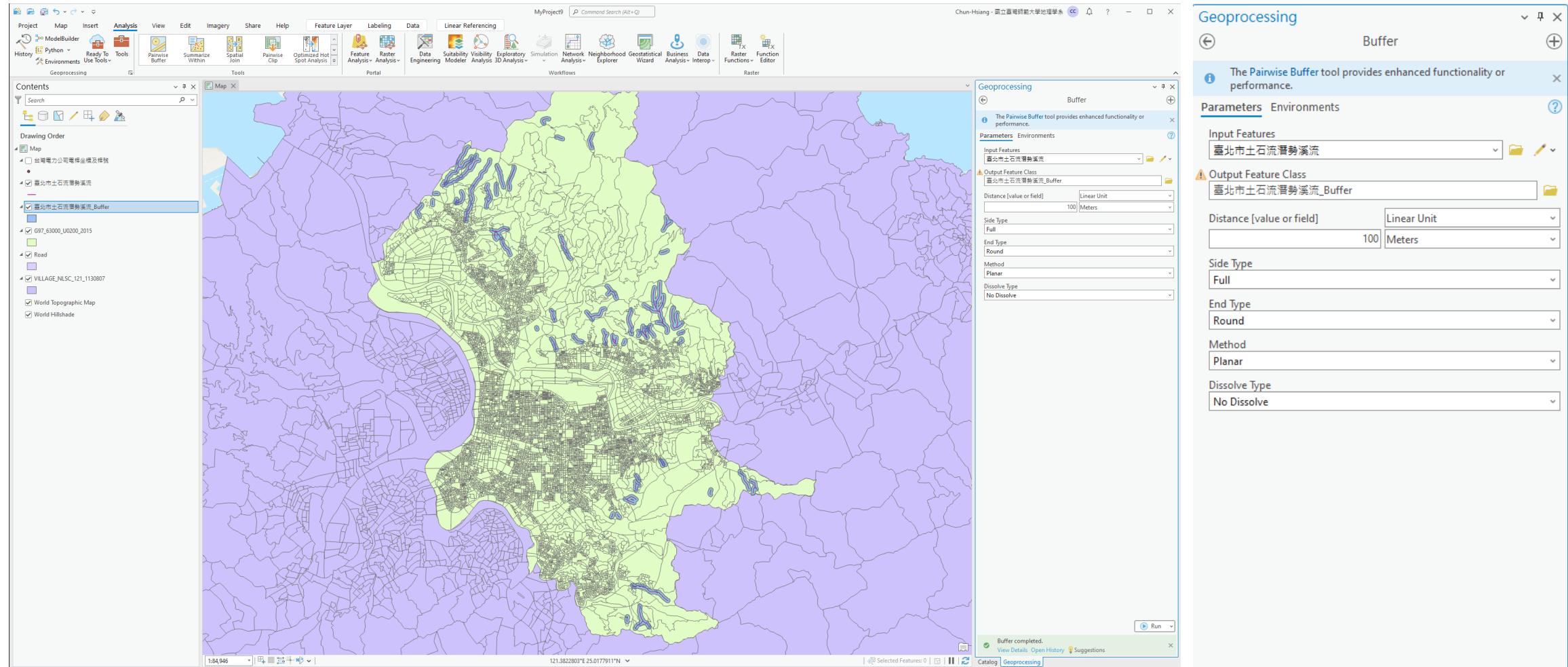
Open in Finder



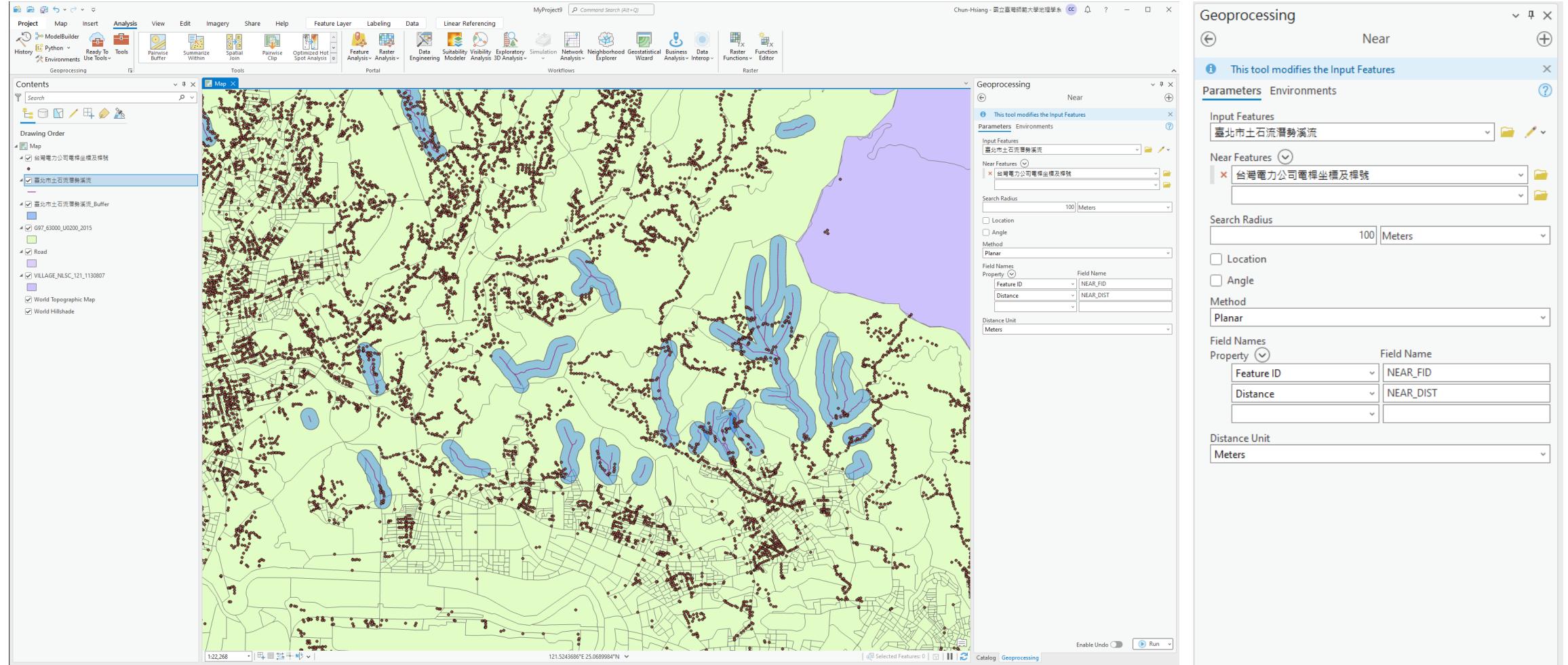
Load All Datasets



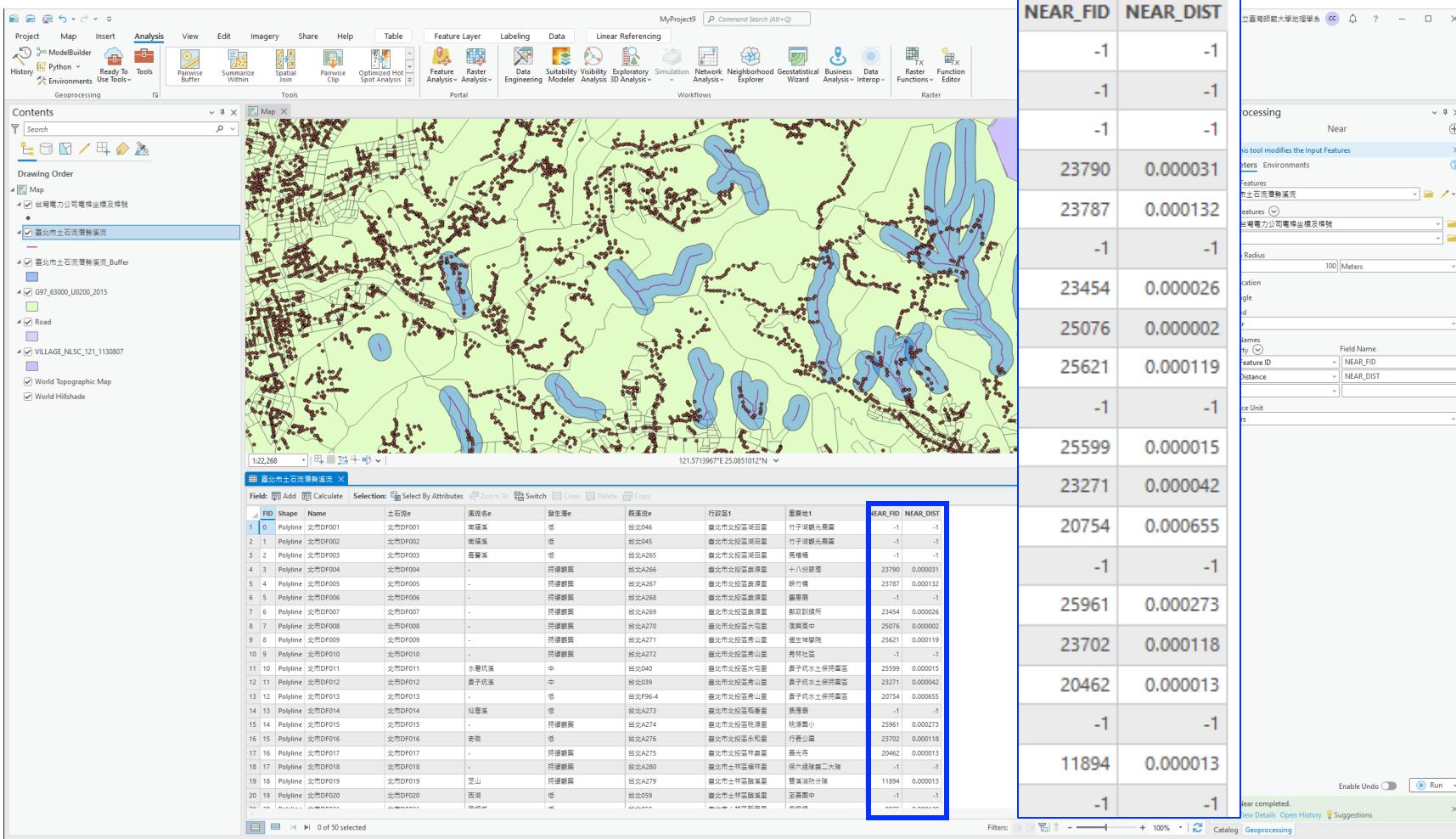
Buffer Analysis for DF Polylines with 100m



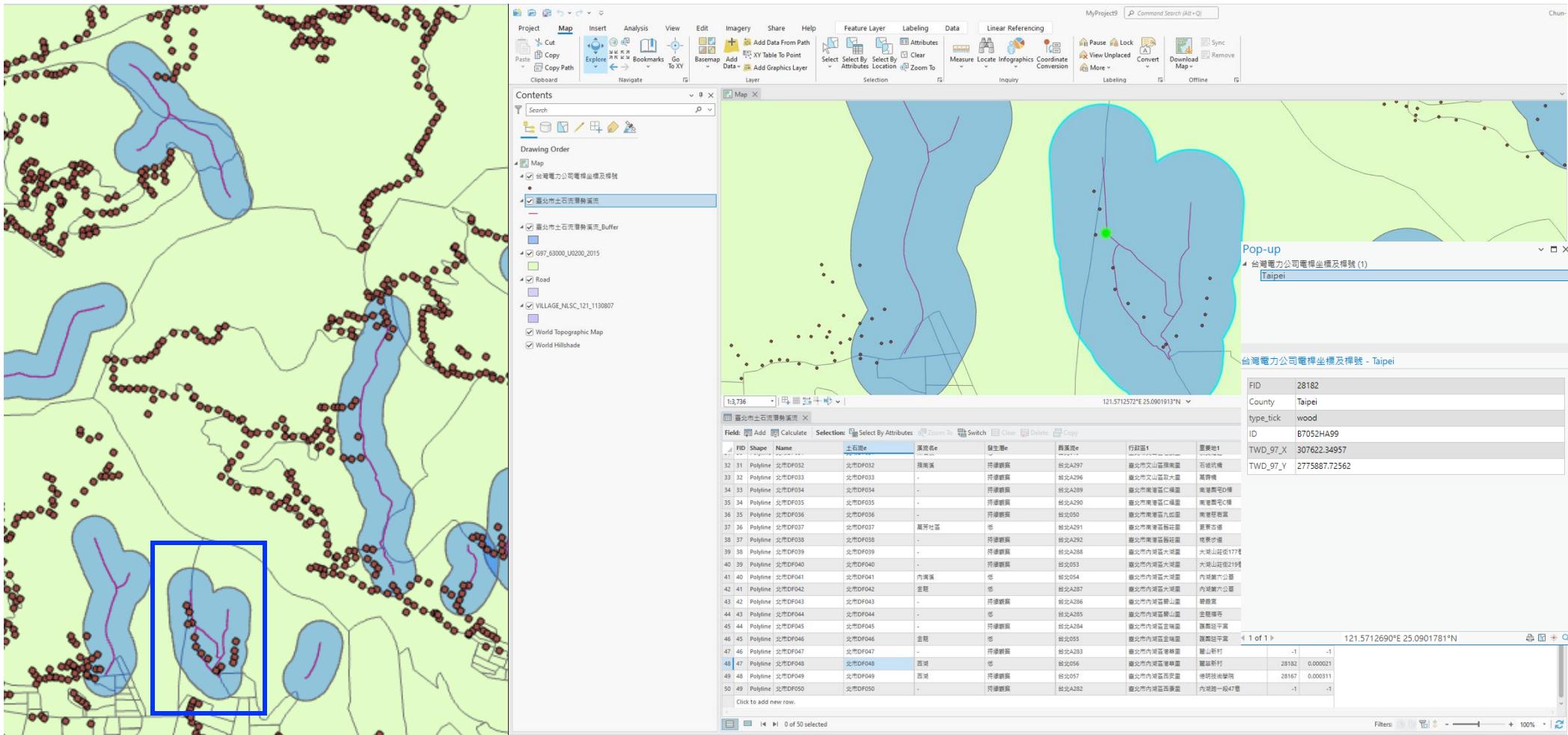
Near Analysis for Finding the Nearest UP from the DF polylines



Near Analysis for Finding the Nearest UP from the DF polylines



[Polyline] Observation the Nearest Point

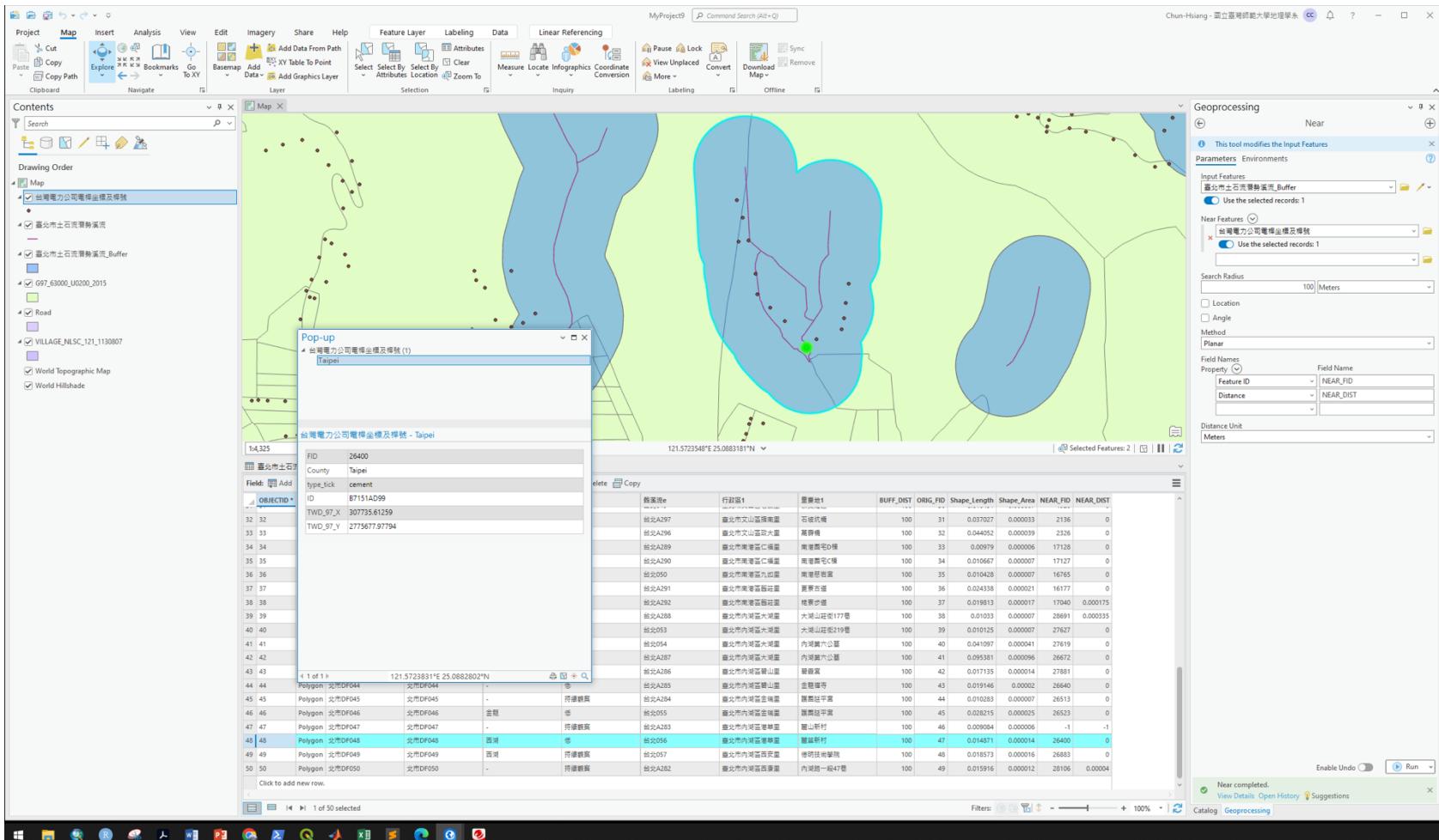


Near Analysis for Finding the Nearest UP from the 100m-DF-buffer

The screenshot shows the ArcGIS Pro interface with a map of northern Taiwan. The map displays several blue polygon buffers representing stream buffer zones. A legend on the left identifies these features. The 'Near' geoprocessing tool dialog is open on the right, showing parameters for finding the nearest upstream point (UP) within a 100m buffer. The 'Input Features' dropdown is set to '臺北市土石流潛勢溪流_Buffer'. The 'Near Features' dropdown is set to '台灣電力公司電桿坐標及桿號'. The 'Search Radius' is set to 100 Meters. The 'Method' is set to 'Planar'. The 'Field Names' section maps 'Feature ID' to 'NEAR_FID' and 'Distance' to 'NEAR_DIST'. The 'Distance Unit' is set to 'Meters'.

OBJECTID*	Shape *	Name	土石流	溪流名	發生地	斷面圖	行政區	重要地	BUFF_DIST	ORIG_FID	Shape_Length	Shape_Area	NEAR_FID	NEAR_DIST	
21	Polygon	北市DF021		猴頭溪	俗		台北058	臺北市大林新莊里	高興橋	100	20	0.028765	0.000026	8708	0
22	Polygon	北市DF022		-	持樟鶯溪		台北060	臺北市大林新溪山里	雙美淨水廠	100	21	0.02385	0.00002	5713	0
23	Polygon	北市DF023		內雙溪	俗		台北A278	臺北市大林新溪山里	雙人橋	100	22	0.012071	0.000008	-1	-1
24	Polygon	北市DF024		內雙溪	俗		台北A277	臺北市大林新溪山里	天美二橋	100	23	0.021114	0.000019	10332	0
25	Polygon	北市DF025		大五	持樟鶯溪		台北281	臺北市大同大五里	貴源裡管站	100	24	0.016846	0.000013	18287	0
26	Polygon	北市DF026		-	俗		台北295	臺北市大同大五里	興興街000巷	100	25	0.009423	0.000006	500	0.000145
27	Polygon	北市DF027		-	俗		台北294	臺北市大同大五里	麗水三街	100	26	0.009573	0.000006	501	0
28	Polygon	北市DF028		松山	持樟鶯溪		台北293	臺北市大同大五里	麗天里	100	27	0.022106	0.00002	140	0
29	Polygon	北市DF029		松山	俗		台北051	臺北市大同松山里	蓮池里	100	28	0.015447	0.000013	174	0
30	Polygon	北市DF030		松山	持樟鶯溪		台北052	臺北市大同松山里	蓮池里	100	29	0.010761	0.000007	705	0
31	Polygon	北市DF031		無名溪	俗		台北019	臺北市大同老農里	崇興壁	100	30	0.010491	0.000007	1926	0
32	Polygon	北市DF032		持樟鶯溪			台北297	臺北市大同富基里	石城坑橋	100	31	0.037027	0.000033	2136	0
33	Polygon	北市DF033		-	持樟鶯溪		台北296	臺北市大同富政里	萬帶橋	100	32	0.044052	0.000039	2326	0
34	Polygon	北市DF034		持樟鶯溪			台北289	臺北市大同富基里	東港西河D橋	100	33	0.00979	0.00006	17128	0
35	Polygon	北市DF035		-	持樟鶯溪		台北290	臺北市南港富仁里	東港西河C橋	100	34	0.010667	0.000007	17127	0
36	Polygon	北市DF036		持樟鶯溪			台北050	臺北市南港富仁里	東港西河B橋	100	35	0.010428	0.000007	16765	0
37	Polygon	北市DF037		萬芳社區	俗		台北291	臺北市南港富仁里	東芳古道	100	36	0.024338	0.000021	16177	0
38	Polygon	北市DF038		-	持樟鶯溪		台北A292	臺北市南港富基里	東芳步道	100	37	0.019813	0.000017	17040	0.000175
39	Polygon	北市DF039		-	持樟鶯溪		台北A288	臺北市內湖大湖里	大湖山莊177巷	100	38	0.01033	0.000007	28691	0.000335
40	Polygon	北市DF040		-	持樟鶯溪		台北053	臺北市內湖大湖里	大湖山莊119巷	100	39	0.010125	0.000007	27627	0

[Buffer] Observation the Nearest Point



Intersect Analysis for Selecting All UP within the 100m-DF-buffer

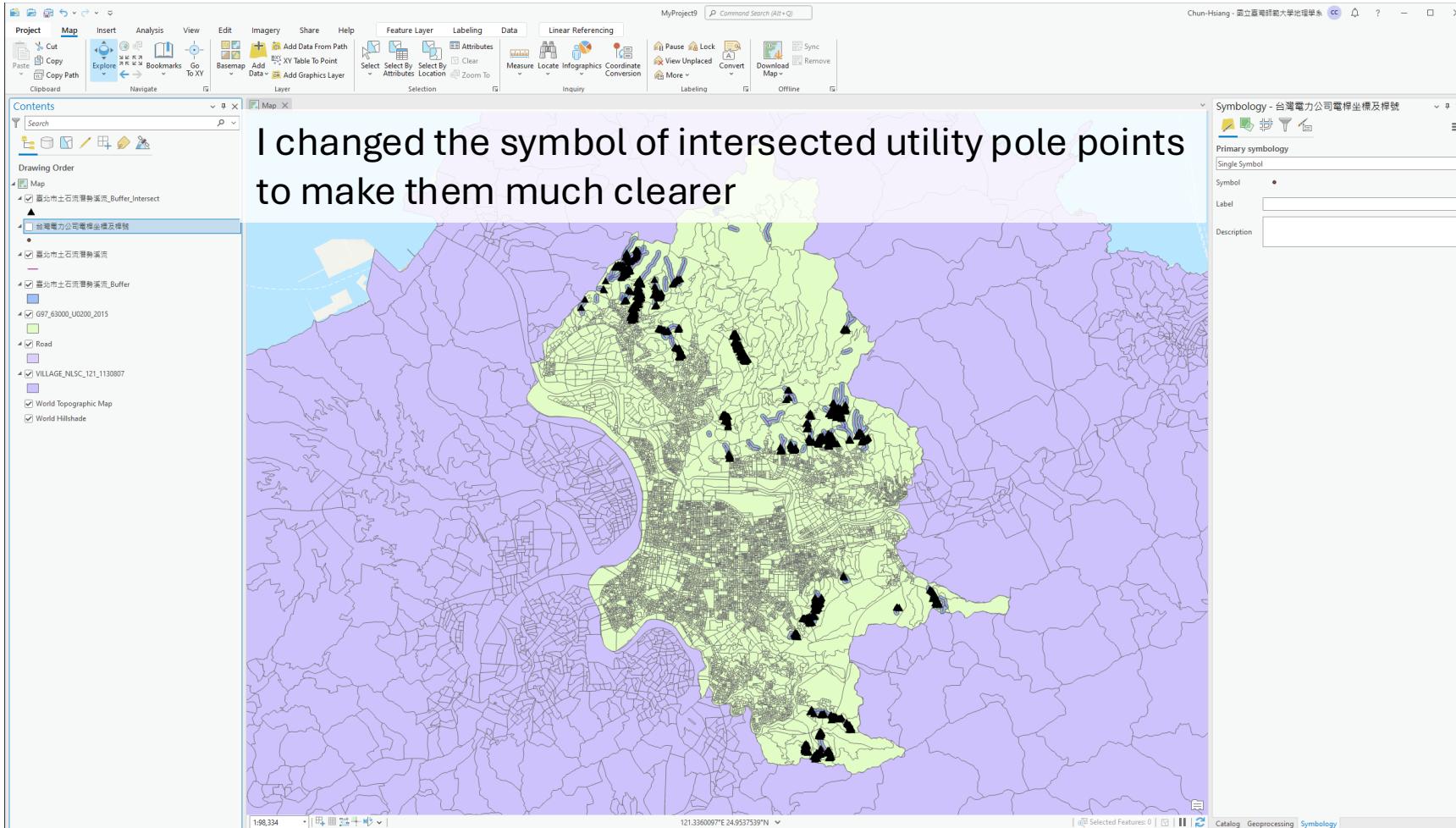
The screenshot illustrates the process of performing an intersect analysis to select all upstream (UP) areas within a 100m Digital Elevation Model (DEM) buffer. The map view shows several large blue shaded areas representing the 100m DEM buffer, overlaid on a green base map. A legend on the left identifies various layers, including '臺灣電力公司電桿坐標及桿號' (Taiwan Power Company Pole Coordinates and Pole Numbers), '臺北市土石流潛勢溪流_Buffer' (Taipei City Landslide Susceptibility Stream Buffer), 'G97_3000_U0200_2015', 'Road', 'VILLAGE_NLSC_121_1130807', 'World Topographic Map', and 'World Hillshade'. The Geoprocessing pane on the right details the 'Intersect' tool setup:

- Input Features:** 台北市土石流潛勢溪流_Buffer (selected)
- Input Features:** 台灣電力公司電桿坐標及桿號 (unchecked)
- Output Feature Class:** 台北市土石流潛勢溪流_Buffer_Intersect
- Attributes To Join:** All attributes
- Output Type:** Same as input

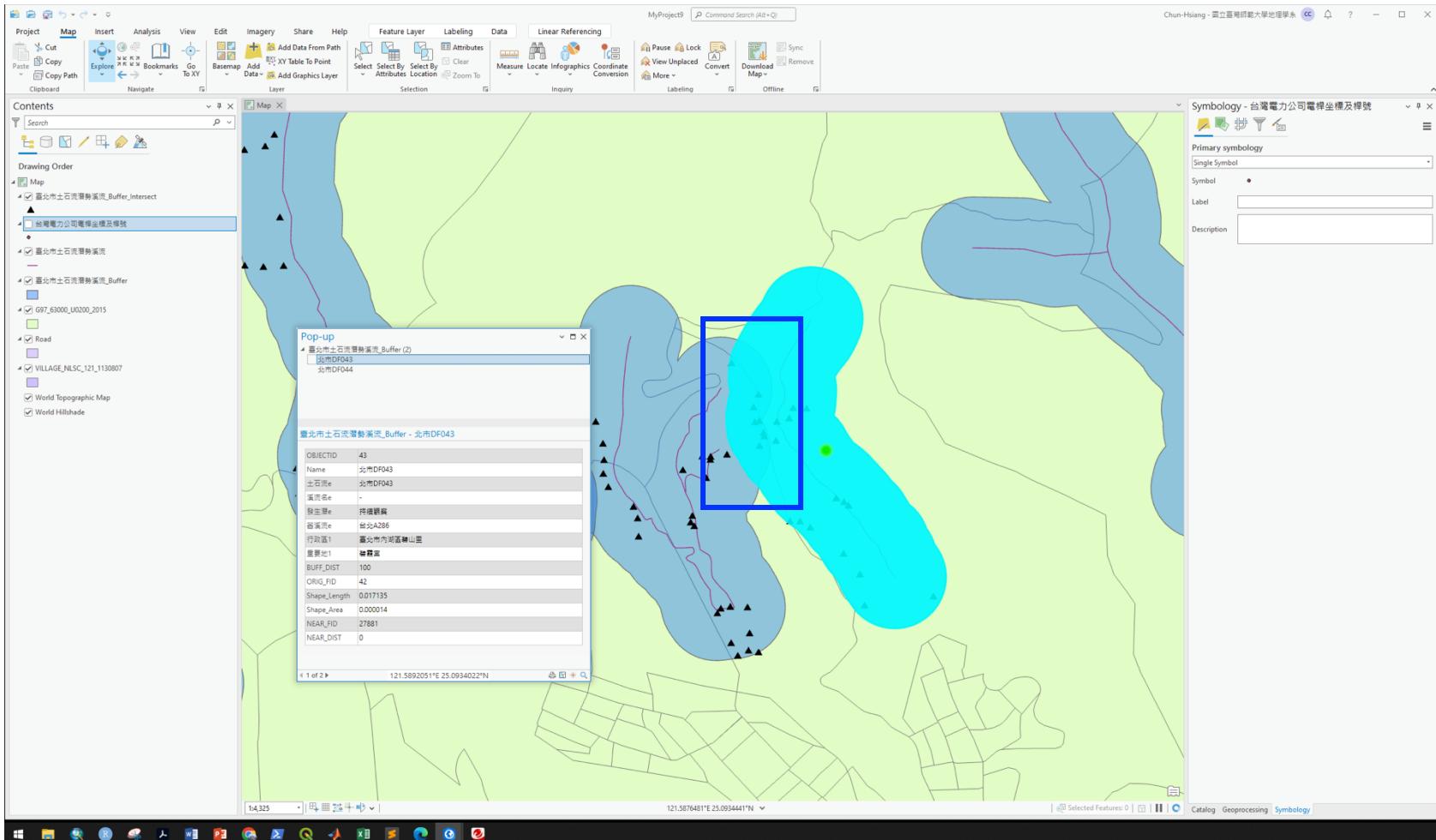
The table below shows the resulting intersected features from the 'Intersect' tool, listing various stream segments and their characteristics.

OBJECTID	Shape*	Name	流域名稱	流域面積	行政區	重要性	BUFF_DIST	ORIG_FID	Shape_Length	Shape_Area	NEAR_FID	NEAR_DIST		
32	Polygon	北市DF032	北市DF032	捷南溪	捷南溪	台北A297	臺北市文山區指南里	石碇共場	100	31	0.037027	0.000033	2136	0
33	Polygon	北市DF033	-	捷南溪	捷南溪	台北A296	臺北市文山區大里	基辟橋	100	32	0.044052	0.000039	2326	0
34	Polygon	北市DF034	-	捷南溪	捷南溪	台北A289	臺北市南港區仁愛里	東港西宅0裡	100	33	0.00979	0.000006	17128	0
35	Polygon	北市DF035	-	捷南溪	捷南溪	台北A290	臺北市南港區仁愛里	南港豪宅0裡	100	34	0.010667	0.000007	17127	0
36	Polygon	北市DF036	北市DF036	捷南溪	捷南溪	台北A050	臺北市南港區九如里	南港莊首裏	100	35	0.010428	0.000007	16765	0
37	Polygon	北市DF037	北市DF037	基芳社區	捷南溪	台北A291	臺北市南港區基芳里	東芳社區	100	36	0.024338	0.000021	16177	0
38	Polygon	北市DF038	北市DF038	-	捷南溪	台北A292	臺北市內湖區大湖里	捷南溪	100	37	0.019813	0.000017	17040	0.000175
39	Polygon	北市DF039	北市DF039	-	捷南溪	台北A288	臺北市內湖區大湖里	大湖山莊街177巷	100	38	0.01038	0.000007	28691	0.000335
40	Polygon	北市DF040	北市DF040	-	捷南溪	台北A285	臺北市內湖區大湖里	大湖山莊街219巷	100	39	0.010125	0.000007	27627	0
41	Polygon	北市DF041	北市DF041	內湖溪	捷南溪	台北A054	臺北市內湖區大湖里	內湖第六公昌	100	40	0.041097	0.000041	27619	0
42	Polygon	北市DF042	北市DF042	金碧	捷南溪	台北A287	臺北市內湖區大湖里	內湖第六公昌	100	41	0.095381	0.000009	26672	0
43	Polygon	北市DF043	北市DF043	-	捷南溪	台北A286	臺北市內湖區碧山里	碧霞宮	100	42	0.011735	0.000014	27881	0
44	Polygon	北市DF044	北市DF044	-	捷南溪	台北A285	臺北市內湖區碧山里	碧霞宮寺	100	43	0.019146	0.00002	26640	0
45	Polygon	北市DF045	北市DF045	-	捷南溪	台北A284	臺北市內湖區碧山里	捷南溪平洋	100	44	0.010283	0.000007	26513	0
46	Polygon	北市DF046	北市DF046	金碧	捷南溪	台北A055	臺北市內湖區金碧里	捷南溪平洋	100	45	0.028215	0.000025	26523	0
47	Polygon	北市DF047	北市DF047	-	捷南溪	台北A283	臺北市內湖區金碧里	碧山新村	100	46	0.005084	0.000006	-1	-1
48	Polygon	北市DF048	北市DF048	西湖	捷南溪	台北A286	臺北市內湖區西湖里	碧山新村	100	47	0.014871	0.000014	26400	0
49	Polygon	北市DF049	北市DF049	西湖	捷南溪	台北A057	臺北市內湖區西湖里	碧峰技術學院	100	48	0.018573	0.000016	26883	0
50	Polygon	北市DF050	北市DF050	-	捷南溪	台北A282	臺北市內湖區西湖里	內湖路一段47巷	100	49	0.015916	0.000012	28106	0.00004

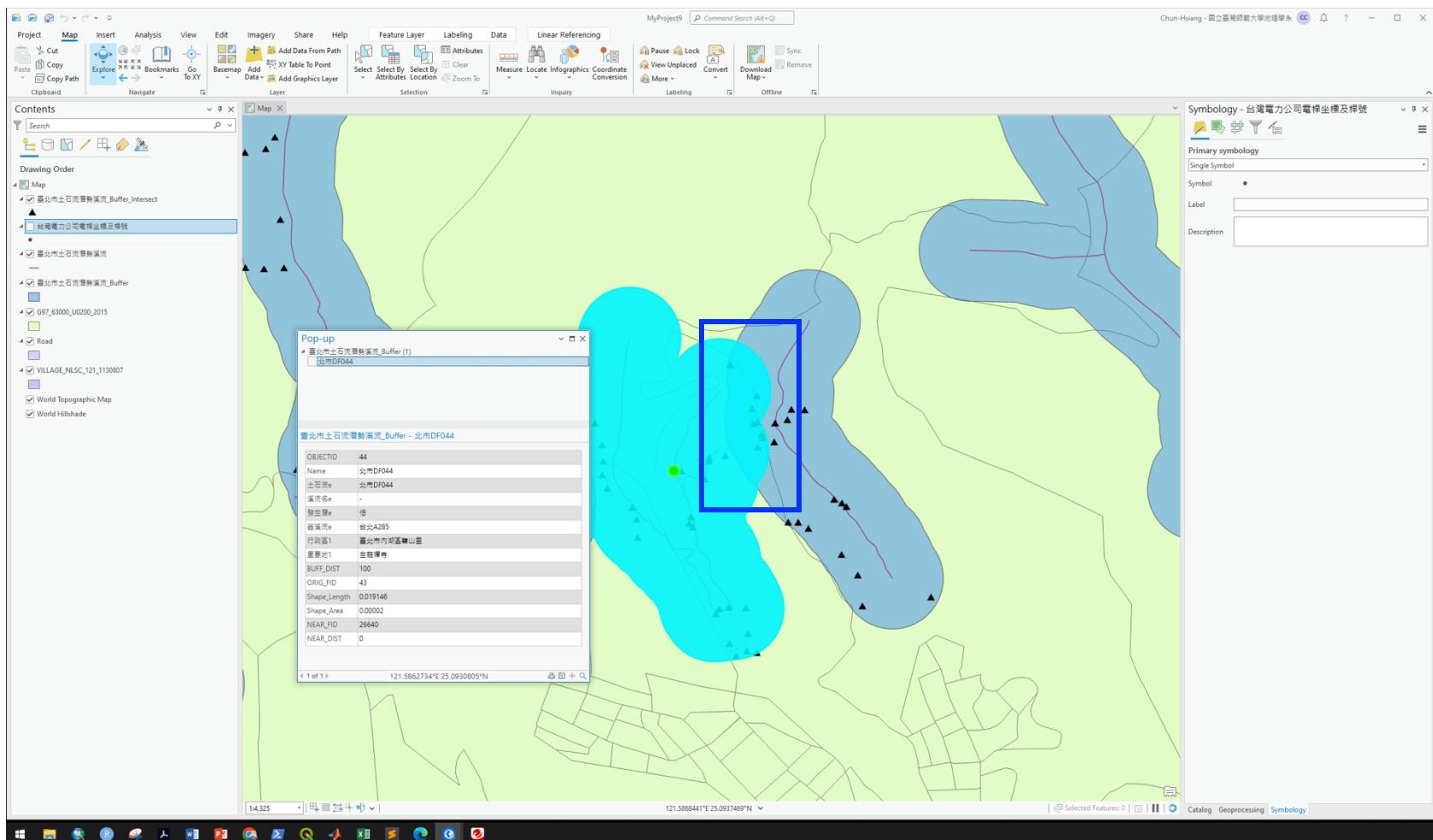
Intersect analysis for selecting all UP within the 100m-DF-buffer



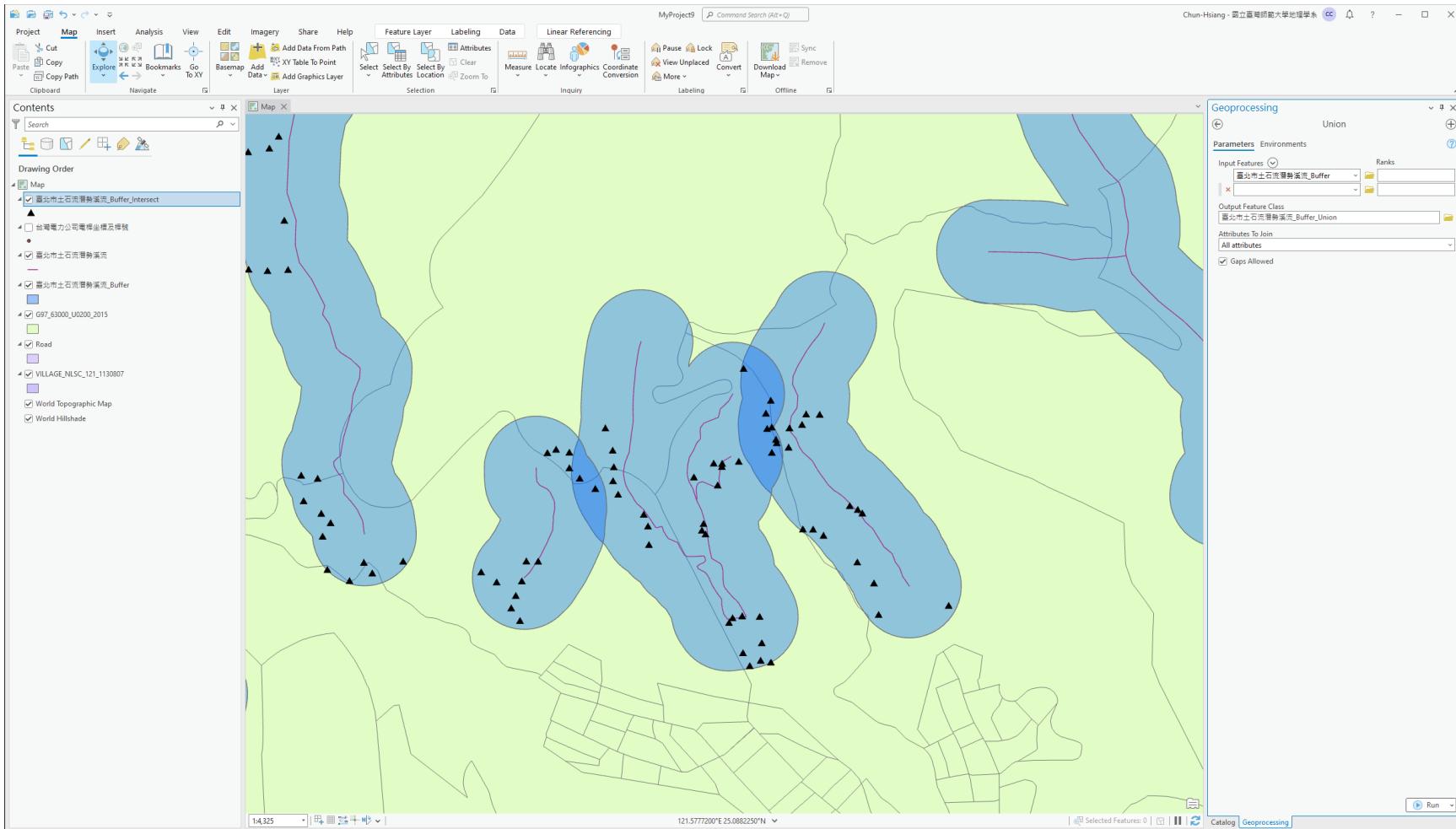
Observation :: The Overlap Areas



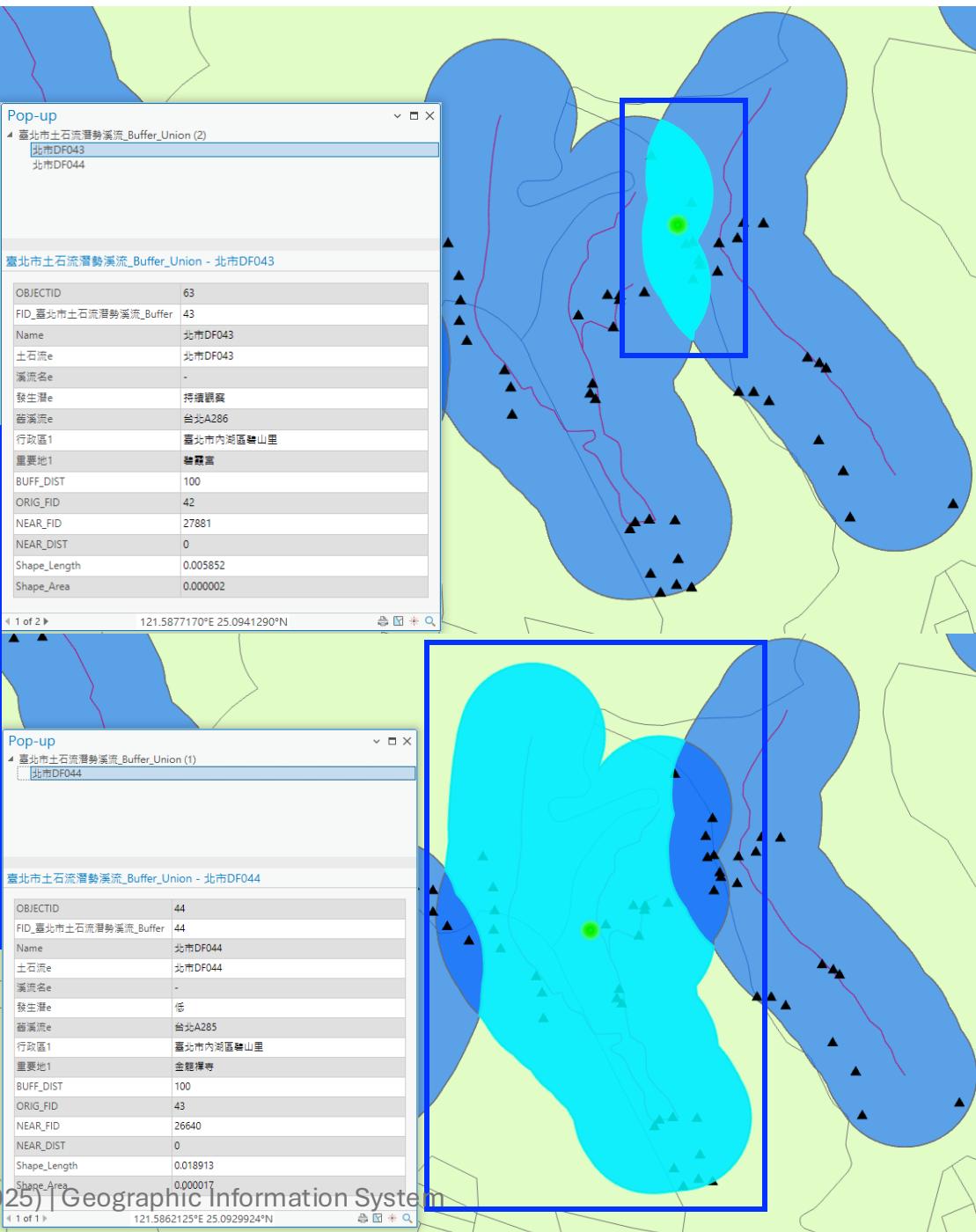
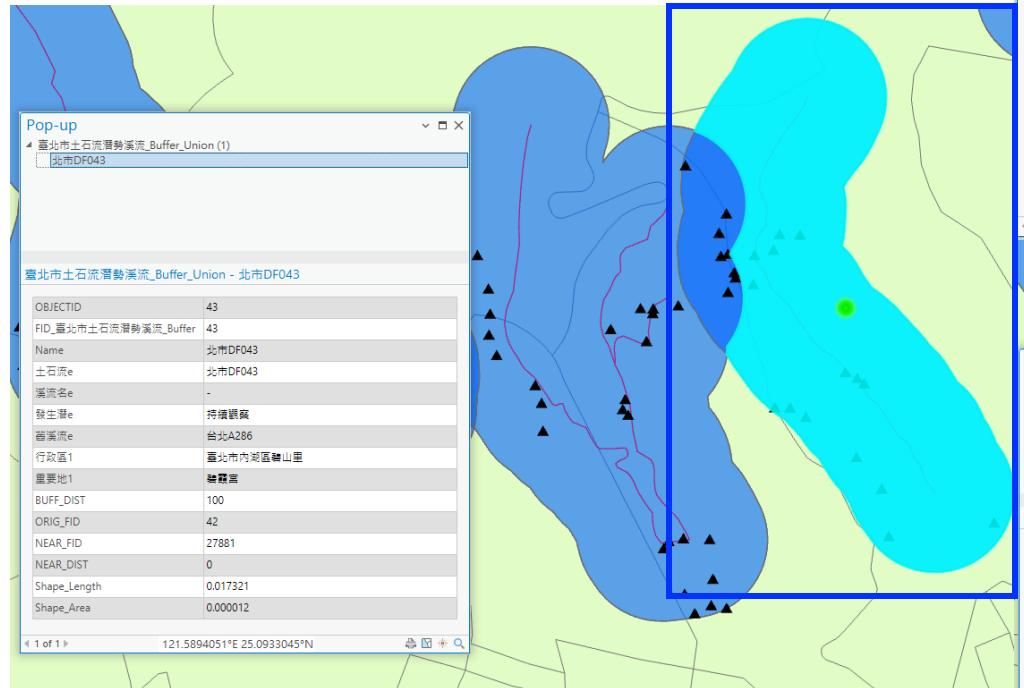
Observation :: The Overlap Areas



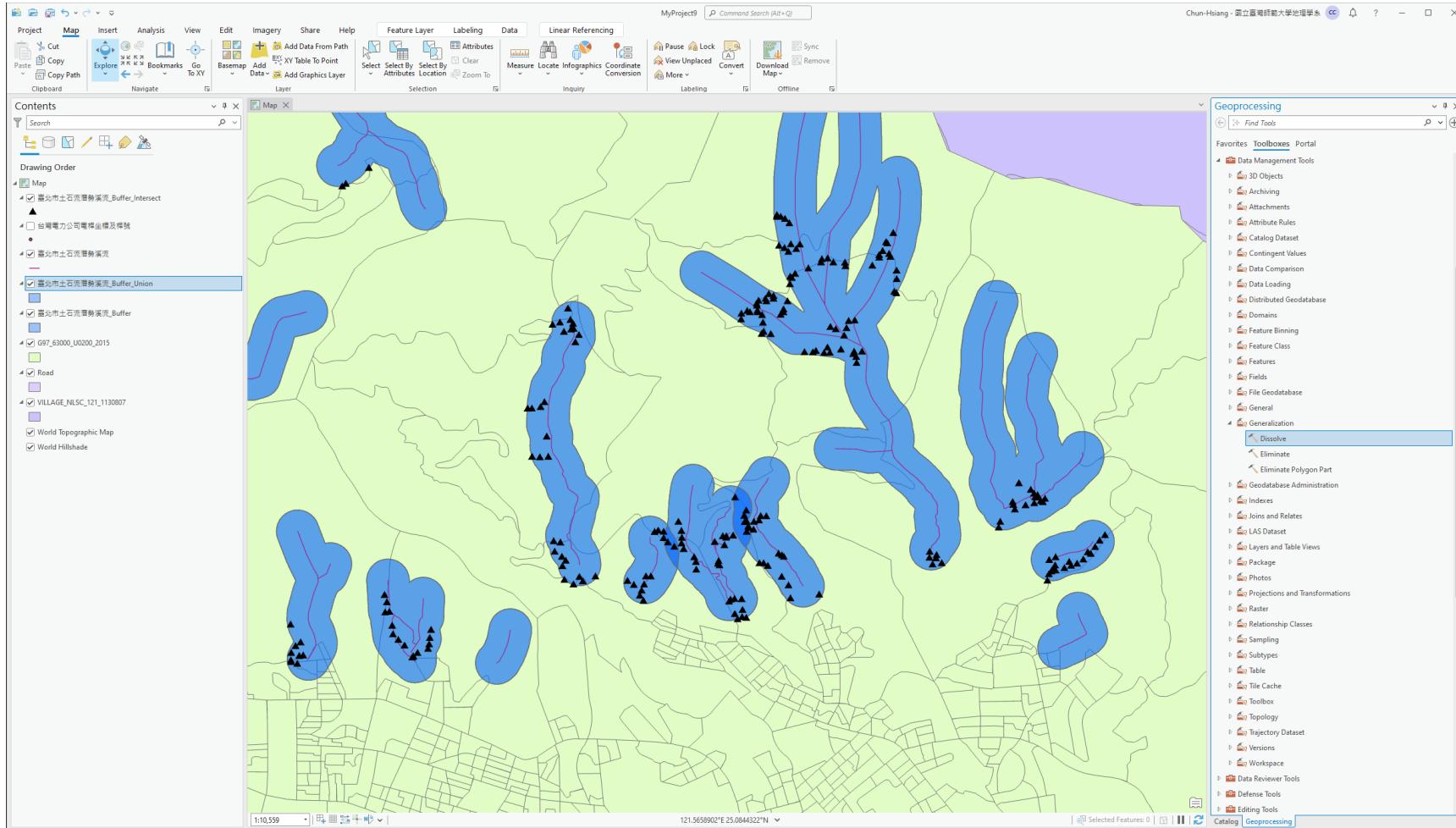
Union Analysis for the 100m-DF-buffer



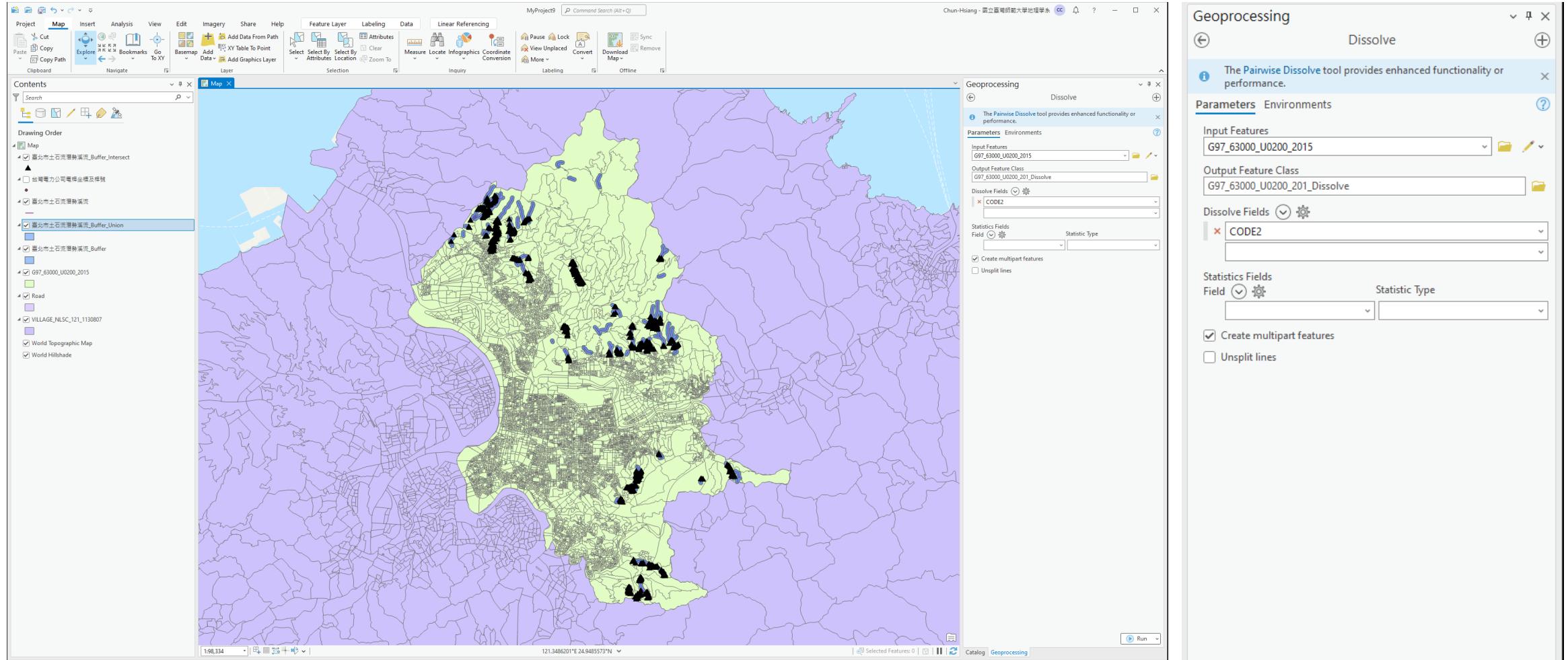
Observation :: Differences



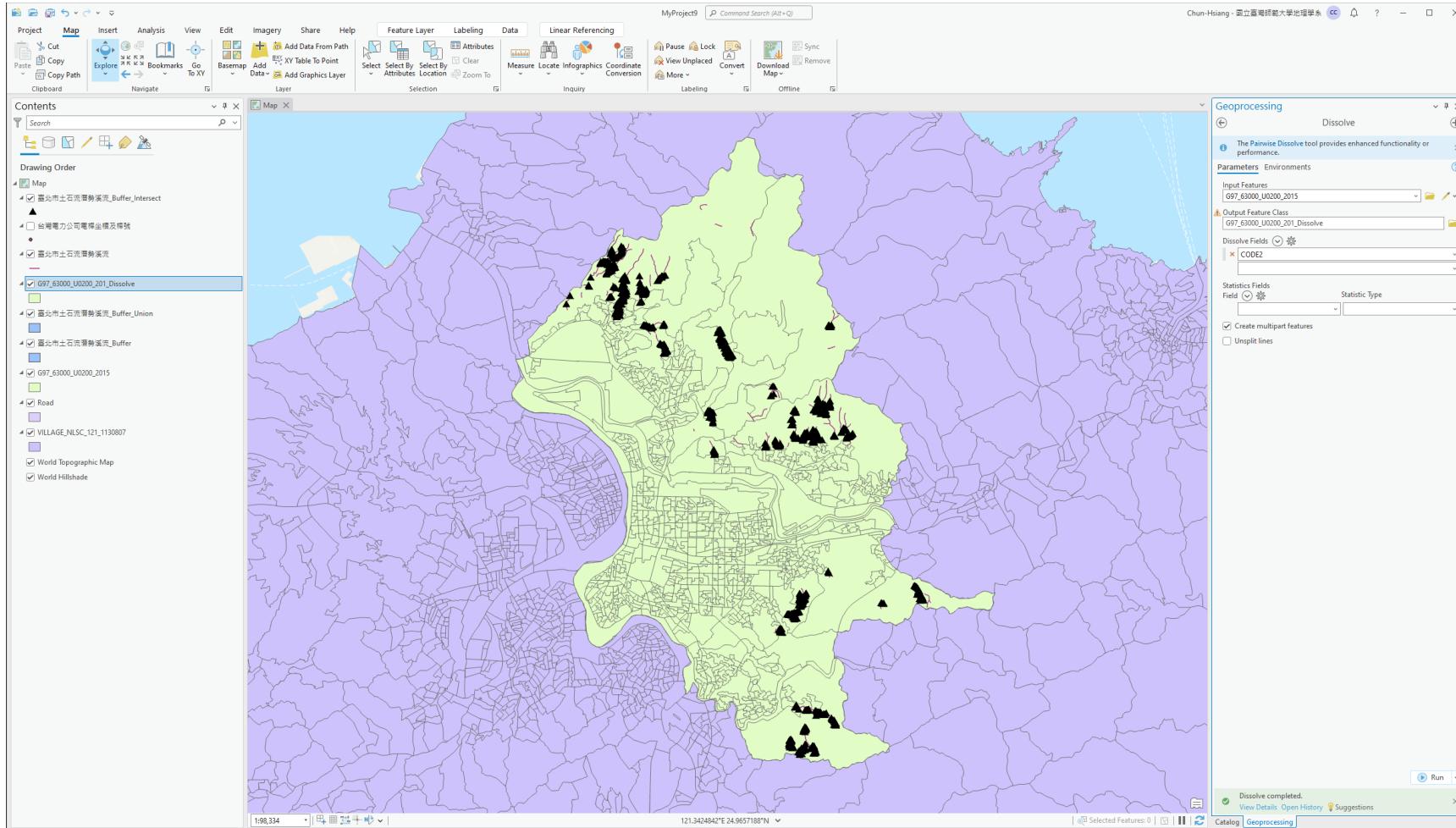
Dissolve the CODEBASE Layer to a CODE2-Resolution Layer



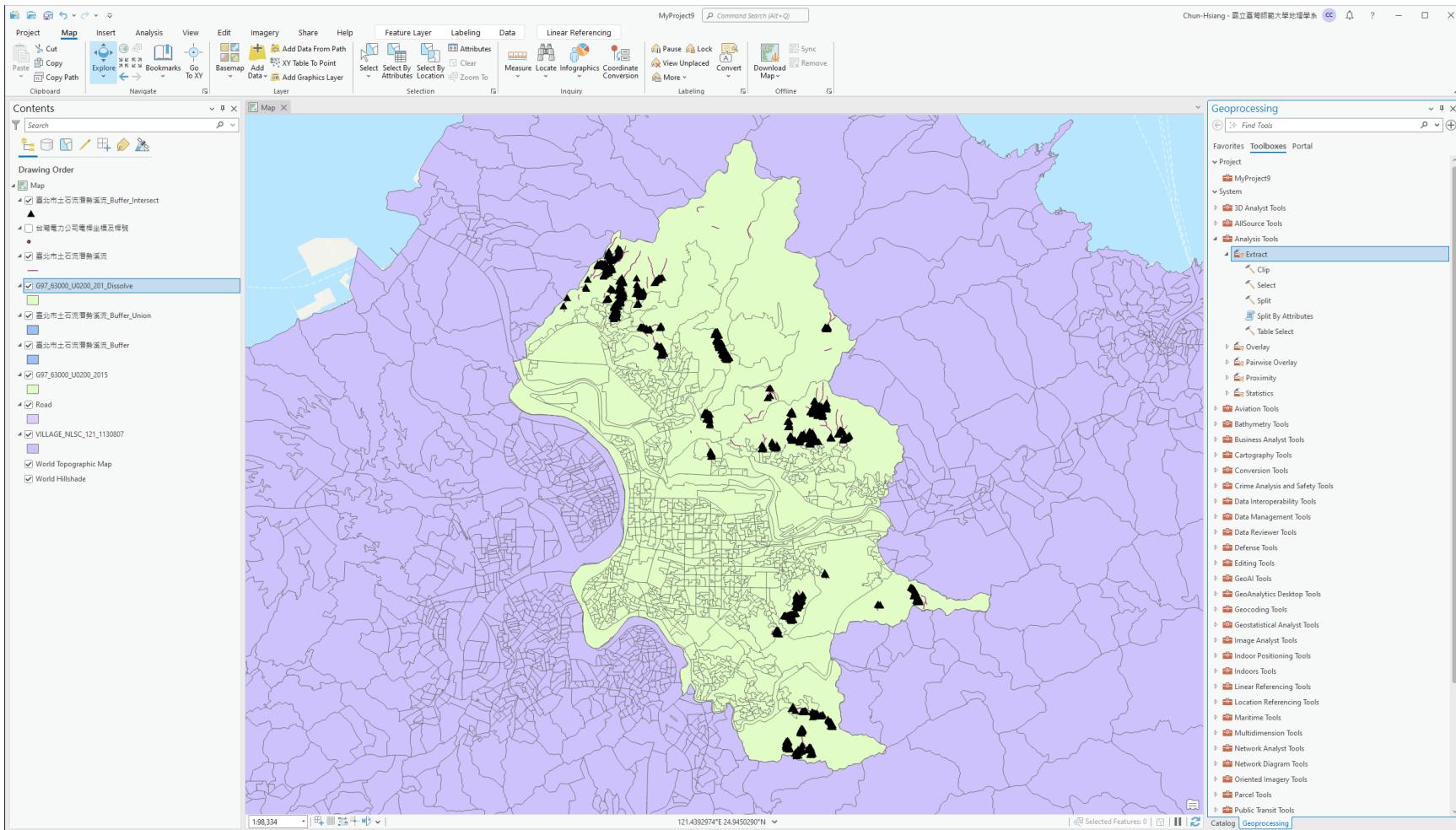
Dissolve the CODEBASE Layer to a CODE2-Resolution Layer



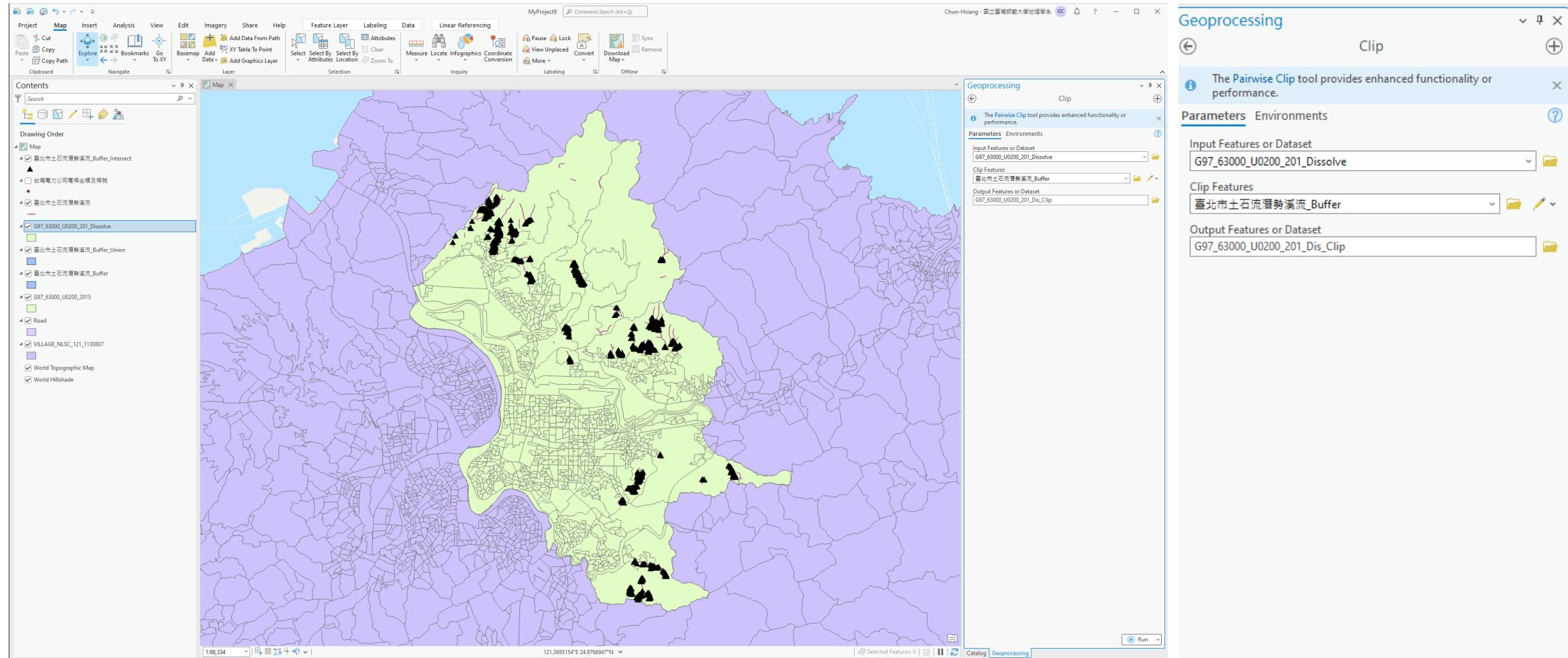
Dissolve the CODEBASE Layer to a CODE2-Resolution Layer



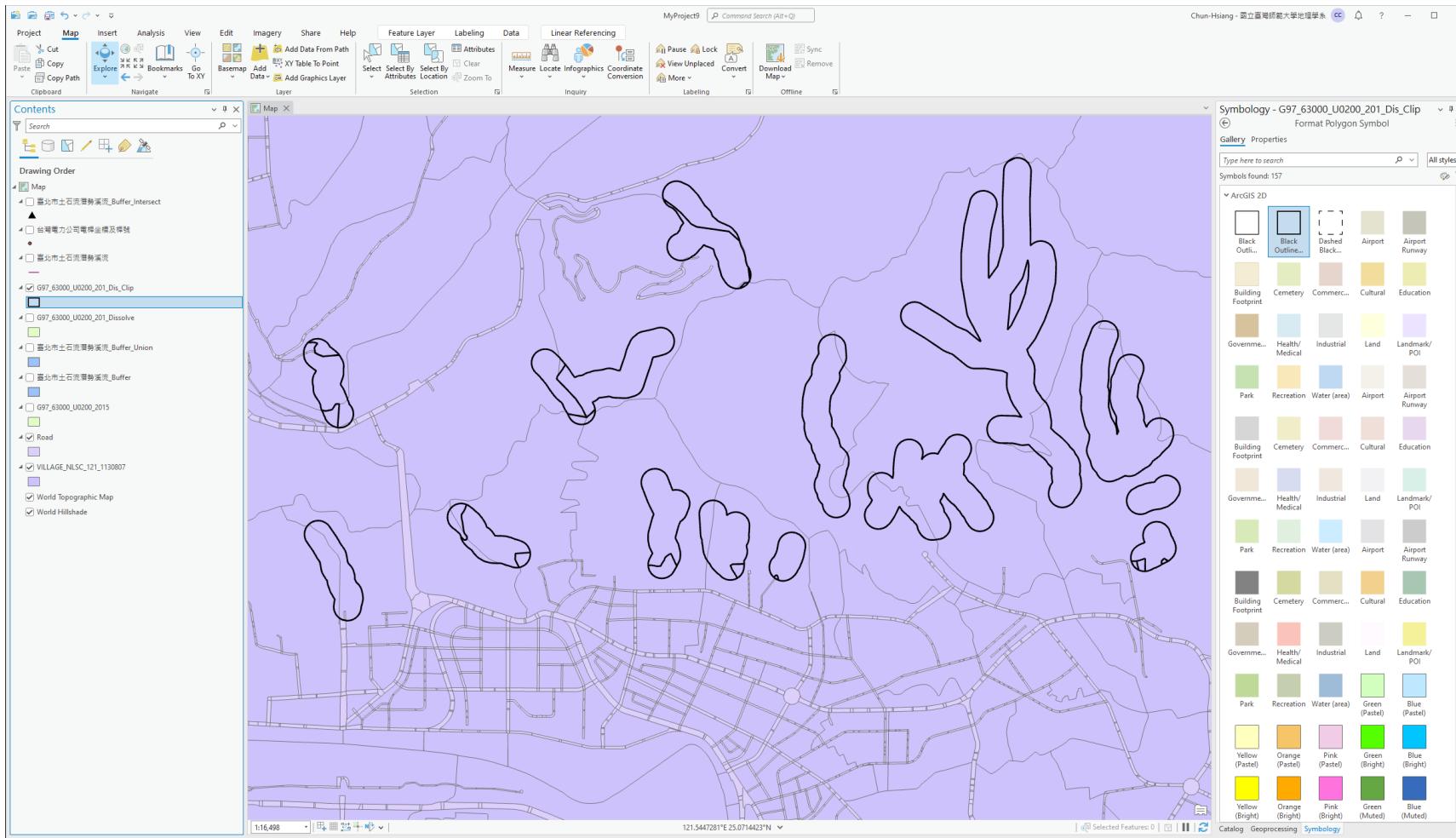
Clip CODE2 Layer by the 100m-DF-buffer



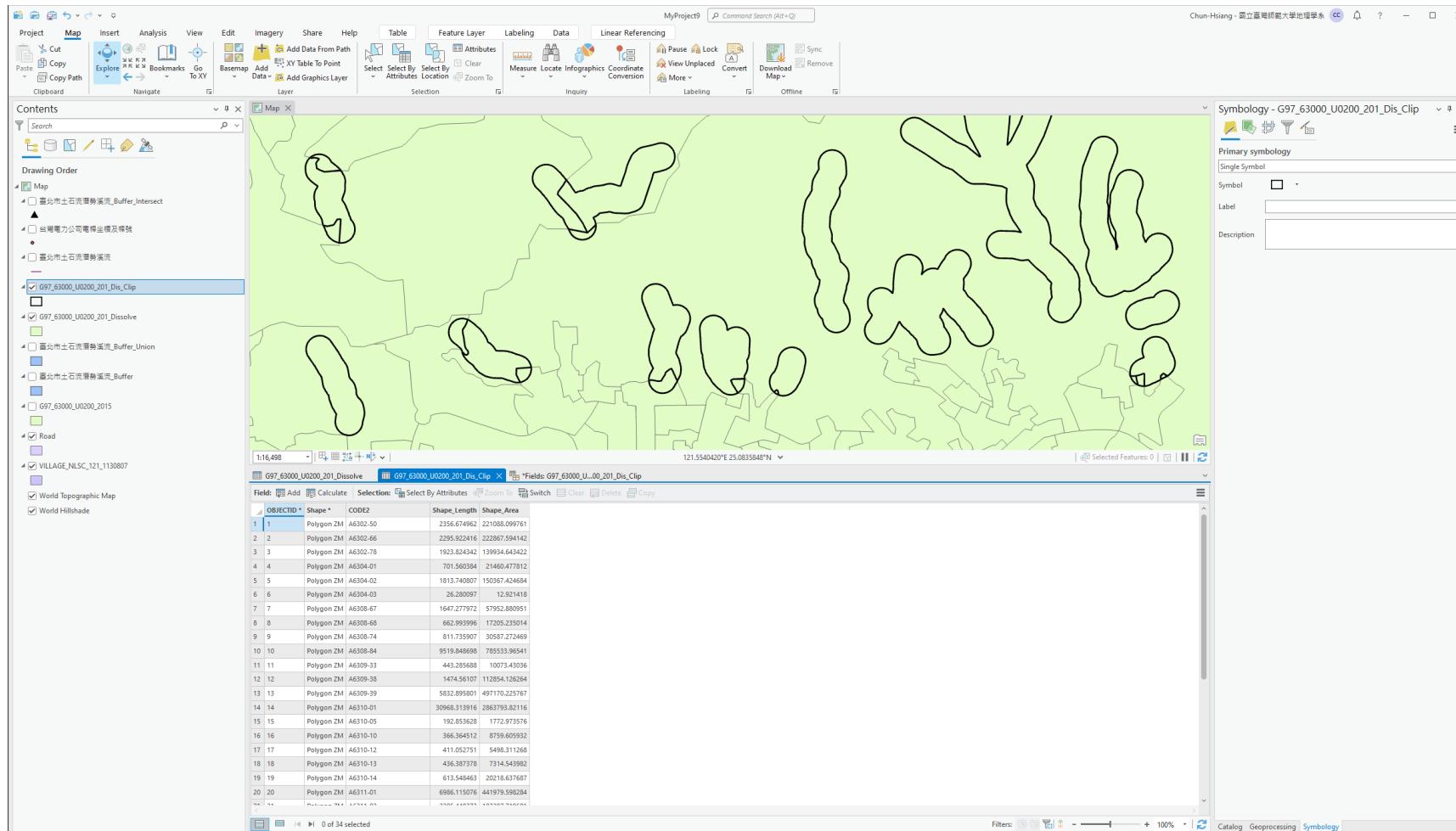
Clip CODE2 Layer by the 100m-DF-buffer



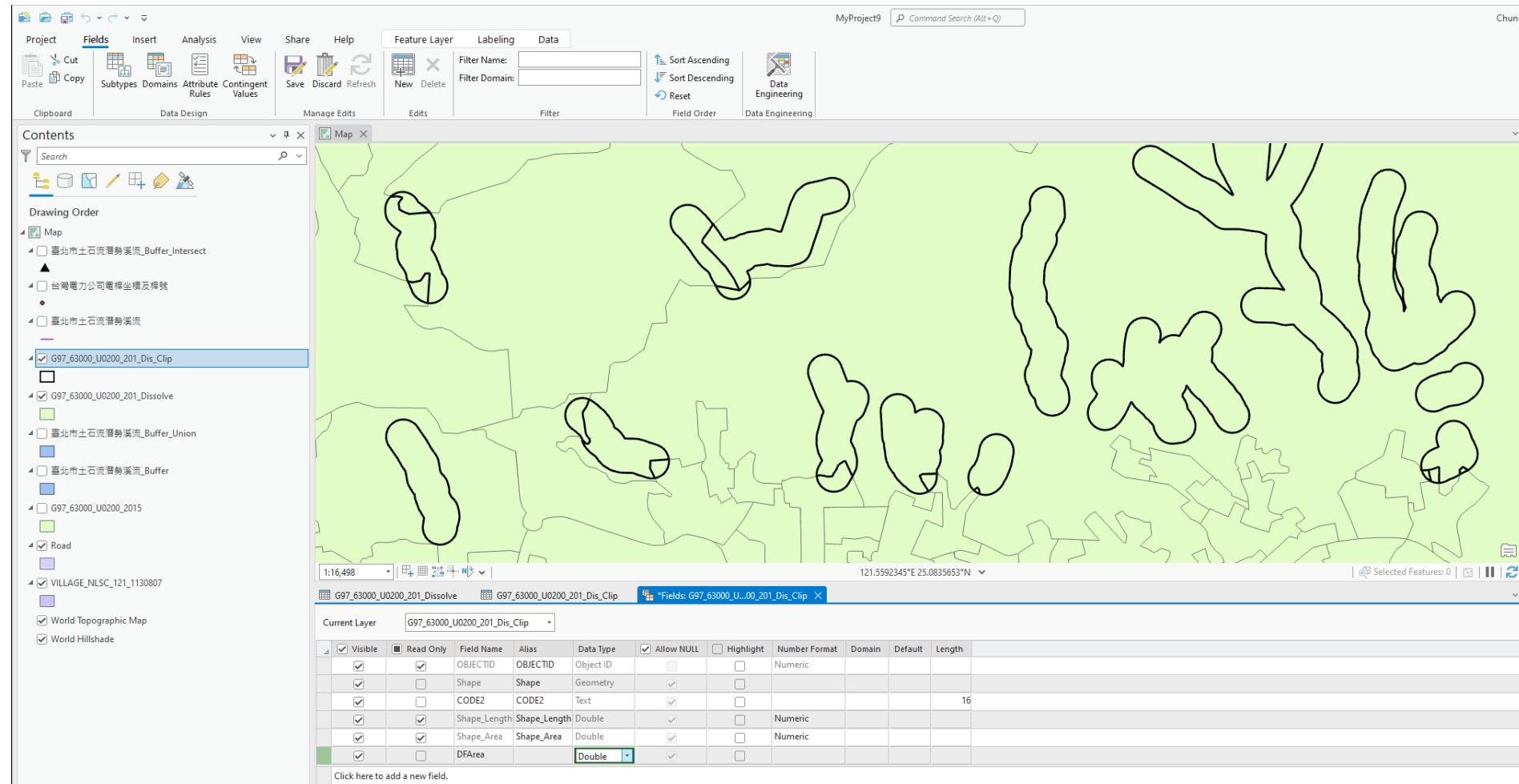
Clip CODE2 Layer by the 100m-DF-buffer



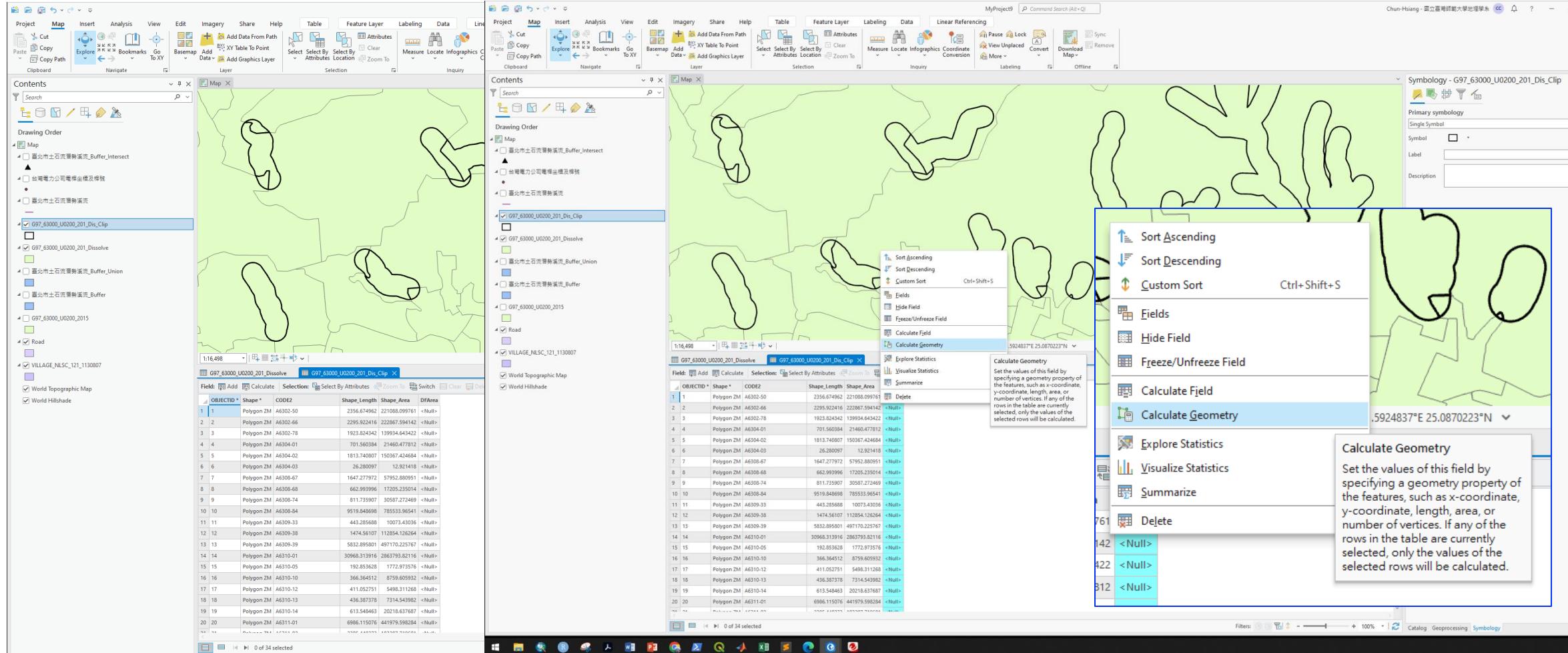
Add Field and Calculate Geometry for Each DF-CODE2 Area



Add Field and Calculate Geometry for Each DF-CODE2 Area



Add Field and Calculate Geometry for Each DF-CODE2 Area



Add Field and Calculate Geometry for Each DF-CODE2 Area

The screenshot shows the ArcGIS Pro interface with a map view and a 'Calculate Geometry' dialog box.

Map View: The map displays several polygon features, including a buffer intersect, a dissolve operation, and a union operation. A specific feature named 'G97_63000_U0200_201_Dis_Clip' is selected in the contents pane.

Calculate Geometry Dialog:

- Input Features:** G97_63000_U0200_201_Dis_Clip
- Geometry Attributes:**
 - Field (Existing or New): DFArea
 - Property: Area (geodesic)
- Area Unit:** Square Kilometers
- Coordinate System:** TWD97_OK

Table View: A table titled 'G97_63000_U0200_201_Dissolve' showing the results of the geometry calculation.

OBJECTID *	Shape *	CODE2	Shape_Length	Shape_Area	DFArea
1	Polygon ZM	A6302-50	2356.674962	221088.099761	<Null>
2	Polygon ZM	A6302-66	2295.922416	222867.594142	0.222893
3	Polygon ZM	A6302-78	1923.824342	139934.643422	0.139951
4	Polygon ZM	A6304-01	701.560384	21460.477812	0.021463
5	Polygon ZM	A6304-02	1813.740007	150567.424654	<Null>
6	Polygon ZM	A6304-03	26.280097	12.921418	<Null>
7	Polygon ZM	A6308-67	1647.277972	57952.880951	0.05796
8	Polygon ZM	A6308-68	662.993996	17205.235014	0.017207
9	Polygon ZM	A6308-74	811.735907	30587.272469	0.030591
10	Polygon ZM	A6308-84	9519.848698	785533.96541	0.785623
11	Polygon ZM	A6309-33	443.285688	10073.43036	443.285688
12	Polygon ZM	A6309-38	1474.56107	112854.126264	0.112867
13	Polygon ZM	A6309-39	5832.895801	497170.225767	<Null>
14	Polygon ZM	A6310-01	30968.319196	2863793.221116	<Null>
15	Polygon ZM	A6310-05	192.855628	1772.973576	0.001773
16	Polygon ZM	A6310-10	366.364512	8759.605932	0.008761
17	Polygon ZM	A6310-12	411.052751	5498.311268	0.005499
18	Polygon ZM	A6310-13	436.387378	7314.543982	<Null>
19	Polygon ZM	A6310-14	613.548463	20218.637687	0.020221
20	Polygon ZM	A6311-01	6986.115076	441979.598284	0.44203
21	Polygon ZM	A6311-02	3205.440777	142207.710204	0.142207

Bottom Status Bar: 0 of 34 selected

Add Field and Calculate Geometry for Each DF-CODE2 Area

The screenshot shows the ArcGIS Pro interface with a map view displaying land parcels. The table below lists attributes for each parcel:

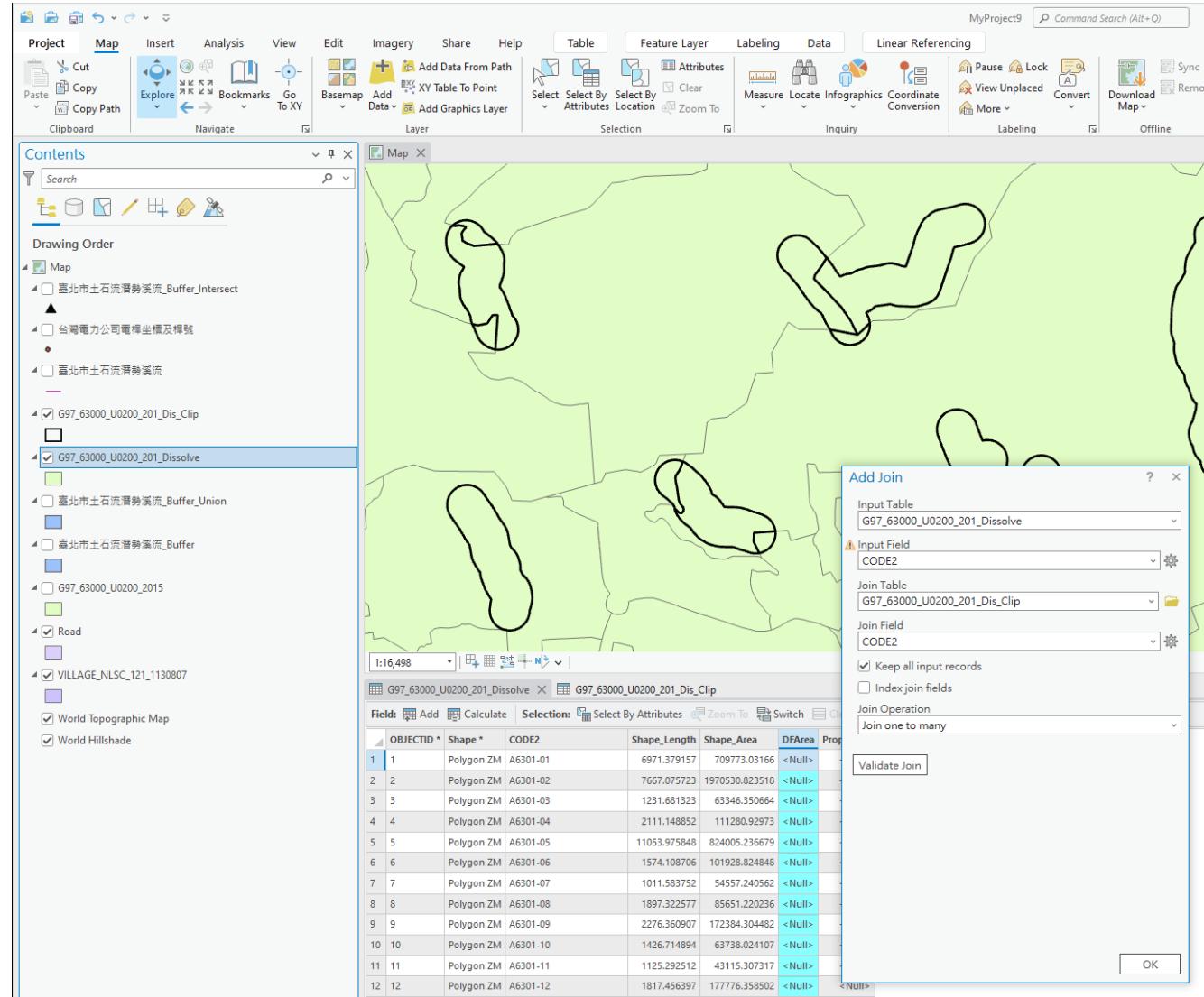
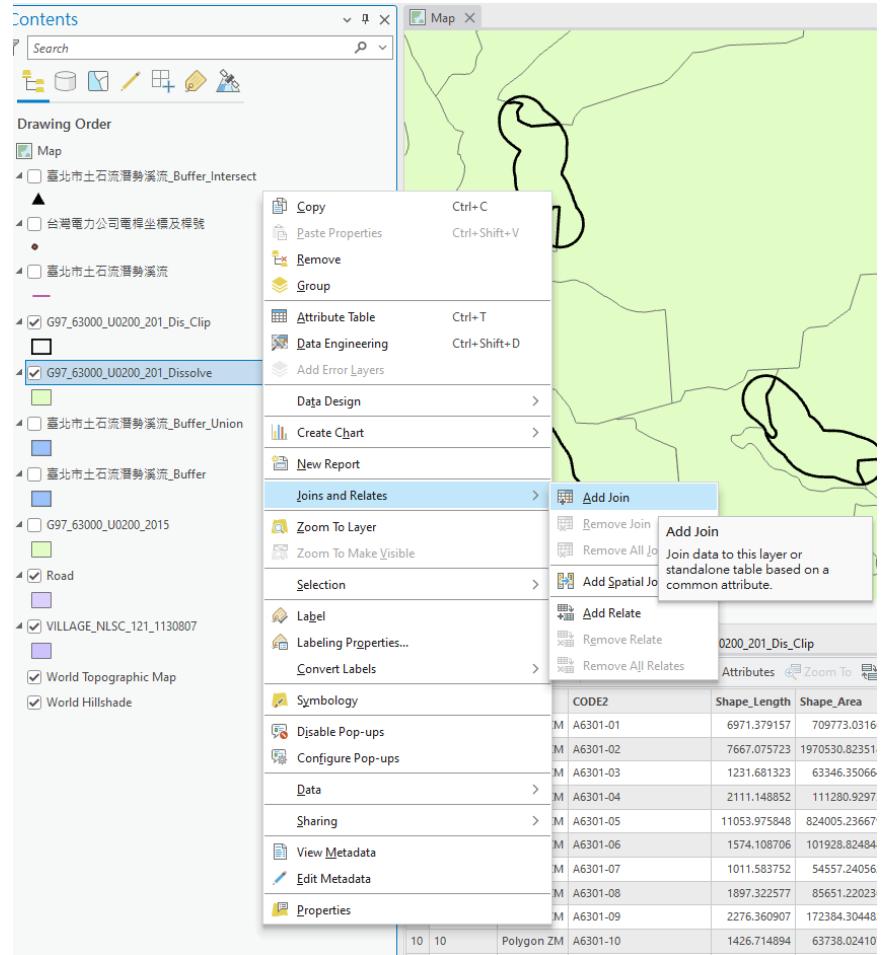
	OBJECTID	Shape*	CODE2	Shape.Length	Shape.Area
1	1	Polygon ZM	A6301-01	6971.379157	709773.03166
2	2	Polygon ZM	A6301-02	7667.075723	1970559.823518
3	3	Polygon ZM	A6301-03	1231.681323	63346.350664
4	4	Polygon ZM	A6301-04	2111.148952	111380.82973
5	5	Polygon ZM	A6301-05	11053.975848	82405.236679
6	6	Polygon ZM	A6301-06	1574.109706	101928.824848
7	7	Polygon ZM	A6301-07	1011.583752	44557.240562
8	8	Polygon ZM	A6301-08	1897.322577	55651.202036
9	9	Polygon ZM	A6301-09	2276.369097	172384.304482
10	10	Polygon ZM	A6301-10	1426.714894	63738.024107
11	11	Polygon ZM	A6301-11	1125.292512	43115.307317
12	12	Polygon ZM	A6301-12	1817.456397	177776.385802
13	13	Polygon ZM	A6301-13	2646.865225	125469.949475
14	14	Polygon ZM	A6301-14	1347.283181	506543.16377
15	15	Polygon ZM	A6301-15	1673.357103	95728.709674
16	16	Polygon ZM	A6301-16	2023.410092	102859.856337
17	17	Polygon ZM	A6301-17	1376.102287	52525.681348
18	18	Polygon ZM	A6301-18	991.896975	54918.391903
19	19	Polygon ZM	A6301-19	960.114049	34662.561331
20	20	Polygon ZM	A6301-20	1024.615093	58643.558145

The screenshot shows the Fields tab in ArcGIS Pro. A new field named "DFArea" is being added to the table. The table structure is as follows:

	Visible	Read Only	Field Name	Alias	Data Type	Allow NULL	Highlight	Number Format
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	OBJECTID	OBJECTID	Object ID	<input type="checkbox"/>	<input type="checkbox"/>	Numeric
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shape	Shape	Geometry	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CODE2	CODE2	Text	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shape.Length	Shape.Length	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shape.Area	Shape.Area	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Numeric
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	DFArea	DFArea	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Proportion	Proportion	Double	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Join the Clipped Layer (Above) to CODE2

Layer by CODE2 ID



Add Field and Calculate Geometry for Each DF-CODE2 Area

ArcGIS Pro interface showing a map of land parcels. A context menu is open over one of the parcels, displaying options such as Sort Ascending, Sort Descending, Custom Sort, Fields, Hide Field, Freeze/Unfreeze Field, Calculate Field, Calculate Geometry, Explore Statistics, Visualize Statistics, Summarize, and Delete. The 'Sort Descending' option is highlighted.

OBJECTID *	Shape *	CODE2 *	Shape_Length	Shape_Area	DFArea	Proportion	OBJECTID	CODE2	Shape_Length	Shape_Area
1	Polygon ZM	A6301-01	6971.379157	709773.03166	<Null>	<Null>	<Null>		<Null>	<Null>
2	Polygon ZM	A6301-02	7667.075723	197050.823518	<Null>	<Null>	<Null>		<Null>	<Null>
3	Polygon ZM	A6301-03	1231.681323	63346.350664	<Null>	<Null>	<Null>		<Null>	<Null>
4	Polygon ZM	A6301-04	2111.140852	111260.2973	<Null>	<Null>	<Null>		<Null>	<Null>
5	Polygon ZM	A6301-05	11053.97588	82405.236679	<Null>	<Null>	<Null>		<Null>	<Null>
6	Polygon ZM	A6301-06	1574.108706	101928.824848	<Null>	<Null>	<Null>		<Null>	<Null>
7	Polygon ZM	A6301-07	1011.583752	54557.240562	<Null>	<Null>	<Null>		<Null>	<Null>
8	Polygon ZM	A6301-08	1897.32257	85651.220236	<Null>	<Null>	<Null>		<Null>	<Null>
9	Polygon ZM	A6301-09	2276.36907	172384.304482	<Null>	<Null>	<Null>		<Null>	<Null>
10	Polygon ZM	A6301-10	1426.714994	63738.024107	<Null>	<Null>	<Null>		<Null>	<Null>
11	Polygon ZM	A6301-11	1123.292512	41315.307317	<Null>	<Null>	<Null>		<Null>	<Null>
12	Polygon ZM	A6301-12	1817.45657	17776.355052	<Null>	<Null>	<Null>		<Null>	<Null>
13	Polygon ZM	A6301-13	2646.065225	125409.804575	<Null>	<Null>	<Null>		<Null>	<Null>
14	Polygon ZM	A6301-14	1347.283181	50564.316377	<Null>	<Null>	<Null>		<Null>	<Null>
15	Polygon ZM	A6301-15	1673.357103	95728.709674	<Null>	<Null>	<Null>		<Null>	<Null>
16	Polygon ZM	A6301-16	2023.410992	102899.856537	<Null>	<Null>	<Null>		<Null>	<Null>
17	Polygon ZM	A6301-17	1376.102287	58256.881348	<Null>	<Null>	<Null>		<Null>	<Null>
18	Polygon ZM	A6301-18	991.896975	54916.391903	<Null>	<Null>	<Null>		<Null>	<Null>
19	Polygon ZM	A6301-19	960.114049	34662.561131	<Null>	<Null>	<Null>		<Null>	<Null>
20	Polygon ZM	A6301-20	1024.615093	58643.558145	<Null>	<Null>	<Null>		<Null>	<Null>

ArcGIS Pro interface showing a map with several dissolved polygons. A context menu is open over one of the dissolved features, displaying options such as Sort Ascending, Sort Descending, Custom Sort, Fields, Hide Field, Freeze/Unfreeze Field, Calculate Field, Calculate Geometry, Explore Statistics, Visualize Statistics, Summarize, and Delete. The 'Sort Descending' option is highlighted.

OBJECTID *	Shape *	CODE2 *	Shape_Length	Shape_Area	DFArea	Proportion	OBJECTID	CODE2	Shape_Length	Shape_Area
1	Polygon ZM	A6310-01	35802.58717	16773771.397303	<Null>	<Null>	14	A6310-01	30968.313916	2863793.82116
2	Polygon ZM	A6312-01	36235.53037	23012787.796187	<Null>	<Null>	27	A6312-01	27836.962807	23923497.68851
3	Polygon ZM	A6312-07	21967.873758	545141.02669	<Null>	<Null>	30	A6312-07	13649.33927	1154260.34027
4	Polygon ZM	A6308-84	28960.260681	14361430.39532	<Null>	<Null>	10	A6308-84	9519.648698	78533.96541
5	Polygon ZM	A6309-39	18175.852091	7318439.627884	<Null>	<Null>	13	A6309-39	5832.895001	497170.225767
6	Polygon ZM	A6311-01	36482.492912	2440049.85391	<Null>	<Null>	20	A6311-01	69866.151076	441979.59824
7	Polygon ZM	A6311-40	5867.135836	1571158.564232	<Null>	<Null>	24	A6311-40	4923.163769	351443.872729
8	Polygon ZM	A6312-41	13376.837834	2661713.94957	<Null>	<Null>	34	A6312-41	3592.55957	302803.427464
9	Polygon ZM	A6302-66	7982.72363	1700215.578099	<Null>	<Null>	2	A6302-66	2295.674982	222867.59424
10	Polygon ZM	A6302-50	5912.836998	1533779.097917	<Null>	<Null>	1	A6302-50	2356.674982	221088.09961
11	Polygon ZM	A6312-02	22404.940563	6846769.703167	<Null>	<Null>	28	A6312-02	3195.120363	22016.888233
12	Polygon ZM	A6311-02	9776.167891	1927664.303882	<Null>	<Null>	21	A6311-02	2305.44073	183287.719601
13	Polygon ZM	A6311-45	12189.36638	2664026.40384	<Null>	<Null>	25	A6311-45	32910.19941	181149.474379
14	Polygon ZM	A6304-02	4760.603808	941965.899415	<Null>	<Null>	5	A6304-02	1813.740087	150367.424684
15	Polygon ZM	A6302-78	9607.669741	1707169.357237	<Null>	<Null>	3	A6302-78	1923.284342	139934.64322
16	Polygon ZM	A6309-38	20808.8899	9070671.516963	<Null>	<Null>	12	A6309-38	1474.56107	112854.26264
17	Polygon ZM	A6311-17	13066.012269	3220618.787599	<Null>	<Null>	23	A6311-17	1853.457036	86282.44281
18	Polygon ZM	A6312-06	2328.184118	184508.267254	<Null>	<Null>	29	A6312-06	1219.222449	61707.099662
19	Polygon ZM	A6311-59	10170.099947	2267933.025032	<Null>	<Null>	26	A6311-59	1284.340514	58438.938303
20	Polygon ZM	A6308-67	3617.24493	190716.112832	<Null>	<Null>	7	A6308-67	1647.277972	57952.80951

Add Field and Calculate Field to Compute the Proportion of DF-buffer Areas

The screenshot illustrates the process of calculating the proportion of DF-buffer areas using the 'Calculate Field' tool in ArcGIS Pro.

Left Panel (Calculate Field Dialog):

- Input Table:** G97_63000_U0200_201_Dissolve
- Field Name (Existing or New):** DFArea
- Expression Type:** Python
- Expression:**

```
G97_63000_U0200_201_Dissolve.DFArea =
!G97_63000_U0200_201_Dis_Clip.DFArea!
```
- Code Block:** (Empty)

Right Panel (Map View):

The map view shows a study area with several polygon features. The buffer areas have been dissolved, and the resulting polygons are colored green. The calculated field, DFArea, represents the proportion of the original buffer area that remains after the dissolve operation.

Add Field and Calculate Field to Compute the Proportion of DF-buffer Areas

The screenshot illustrates the process of calculating the proportion of DF-buffer areas using ArcGIS Pro.

Left Panel: Shows the ArcGIS Pro interface with a map view displaying several polygon layers, including 'G97_63000_U0200_201_Dis_Clip' and 'G97_63000_U0200_201_Dissolve'. The 'Contents' pane on the left lists various layers and projects.

Middle Panel: The 'Calculate Field' dialog is open. The 'Input Table' dropdown shows 'G97_63000_U0200_201_Dissolve'. The 'Field Name (Existing or New)' field contains 'Proportion'. The 'Expression Type' is set to 'Python'. In the 'Expression' section, the code is:

```
G97_63000_U0200_201_Dissolve.Proportion =
!G97_63000_U0200_201_Dis_Clip.DFArea!/(!G97_63000_U0200_201_Dissolve.Shape_Area!)/1000000
```

The 'Helpers' panel on the right lists various Python methods and functions. At the bottom, there are 'Insert Values' fields and a 'Code Block' section.

Right Panel: A table view showing the results of the calculation. The table has columns: OBJECTID, Shape, CODE2, Shape_Length, Shape_Area, DFArea, and Proportion. The data includes rows such as:

OBJECTID	Shape	CODE2	Shape_Length	Shape_Area	DFArea	Proportion
1	Polygon ZM	A6310-01	35802.558717	16773771.397303	2.864118	0.17075
2	Polygon ZM	A6312-01	36235.530337	23012787.796187	2.392668	0.103971
3	Polygon ZM	A6312-07	21967.873758	5451411.026669	1.15442	0.211765
4	Polygon ZM	A6308-84	28960.226081	14361430.39532	0.785623	0.054704
5	Polygon ZM	A6309-39	18175.852091	7318439.627884	0.49722	0.067941
6	Polygon ZM	A6311-01	38482.749212	24402049.85391	0.44203	0.018114
7	Polygon ZM	A6311-40	5867.135836	1571158.564232	0.351486	0.223711
8	Polygon ZM	A6312-41	13376.637834	2661713.94957	0.302843	0.113778
9	Polygon ZM	A6302-66	7982.72363	1700215.578099	0.222893	0.131097
10	Polygon ZM	A6302-50	5912.369098	1553779.097917	0.221113	0.142307
11	Polygon ZM	A6312-02	22404.940563	6846769.703167	0.220198	0.032161
12	Polygon ZM	A6311-02	9776.167891	1927664.303882	0.183311	0.095095
13	Polygon ZM	A6311-45	12189.36603	12189.36603	0.121893	0.121893
14	Polygon ZM	A6304-02	4760.06369	4760.06369	0.047601	0.047601
15	Polygon ZM	A6302-78	9607.66971	9607.66971	0.096077	0.096077
16	Polygon ZM	A6309-38	20868.88	20868.88	0.177007	0.177007
17	Polygon ZM	A6311-17	13966.012269	13966.012269	0.13966	0.13966
18	Polygon ZM	A6312-06	2328.184118	2328.184118	0.061715	0.061715
19	Polygon ZM	A6311-59	10170.099947	10170.099947	0.058446	0.058446
20	Polygon ZM	A6308-67	3617.274493	190716.112832	0.05796	0.303905

Find and Replace all <Null> to Zeros in the Columns of “DFArea” and “Proportion”

The screenshot shows a geographic information system (GIS) interface, likely ArcGIS Pro, with a map of Taiwan displayed. The map features several colored polygons representing different land use or administrative units. On the left, the 'Contents' pane lists various layers, including 'G97_63000_U0200_201_Dissolve' which is currently selected. The 'Geoprocessing' pane on the right shows a 'Dissolve' tool being used on the selected layer. The 'Fields View' pane, located at the bottom right, is the focus of the callout. It displays a list of fields from a table, with the 'Find and Replace' tool highlighted. A callout box points to the 'Find and Replace' button in the ribbon bar of the Fields View pane.

Find and Replace all <Null> to Zeros in the Columns of “DFArea” and “Proportion”

The screenshot shows three overlapping windows of a GIS application interface:

- Top Window:** Shows the search dialog with "Field: <Null>" and "Selection: Find in: DFArea, Proportion". It also has a dropdown with "0" and a "Replace" button.
- Middle Window:** Shows the main data grid with the same search parameters. It displays a table of polygon features with columns: OBJECTID, Shape, CODE2, Shape_Length, Shape_Area, DFArea, Proportion, OBJECTID, CODE2, Shape_Length, Shape_Area, DFArea.
- Bottom Window:** Shows the results of the replacement. It displays the same table with the replaced values. A message at the bottom right says "1746 replacements made".

OBJECTID *	Shape *	CODE2 *	Shape_Length	Shape_Area	DFArea	Proportion	OBJECTID	CODE2	Shape_Length	Shape_Area	DFArea
30 645	Polygon ZM	A6310-10	2309.692429	182630.136277	0.008761	0.047969	16	A6310-10	366.364512	8759.605932	0.008761
31 648	Polygon ZM	A6310-13	2178.017894	93649.349951	0.007315	0.078115	18	A6310-13	436.387378	7314.543982	0.007315
32 647	Polygon ZM	A6310-12	2242.421658	124423.725893	0.005499	0.044195	17	A6310-12	411.052751	5498.311268	0.005499
33 640	Polygon ZM	A6310-05	1663.997841	89965.27483	0.001773	0.019709	15	A6310-05	192.853628	1772.973576	0.001773
34 263	Polygon ZM	A6304-03	7166.640857	1719357.544805	0.000013	0.000008	6	A6304-03	26.280097	12.921418	0.000013
35 1	Polygon ZM	A6301-01	6971.379157	709773.03166	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
36 2	Polygon ZM	A6301-02	7667.075723	1970530.823518	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
37 3	Polygon ZM	A6301-03	1231.681323	63346.350664	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
38 4	Polygon ZM	A6301-04	2111.148852	111280.92973	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
39 5	Polygon ZM	A6301-05	11053.975848	824005.236679	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
40 6	Polygon ZM	A6301-06	1574.108706	101928.824848	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
41 7	Polygon ZM	A6301-07	1011.583752	54557.240562	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
42 8	Polygon ZM	A6301-08	1897.322577	85651.220236	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
43 9	Polygon ZM	A6301-09	2276.360907	172384.304482	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
44 10	Polygon ZM	A6301-10	1426.714894	63738.024107	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
45 11	Polygon ZM	A6301-11	1125.292512	43115.307317	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
46 12	Polygon ZM	A6301-12	1817.456397	177776.358502	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>

Dissolve by CODE2 and Σ DF Area and Proportion

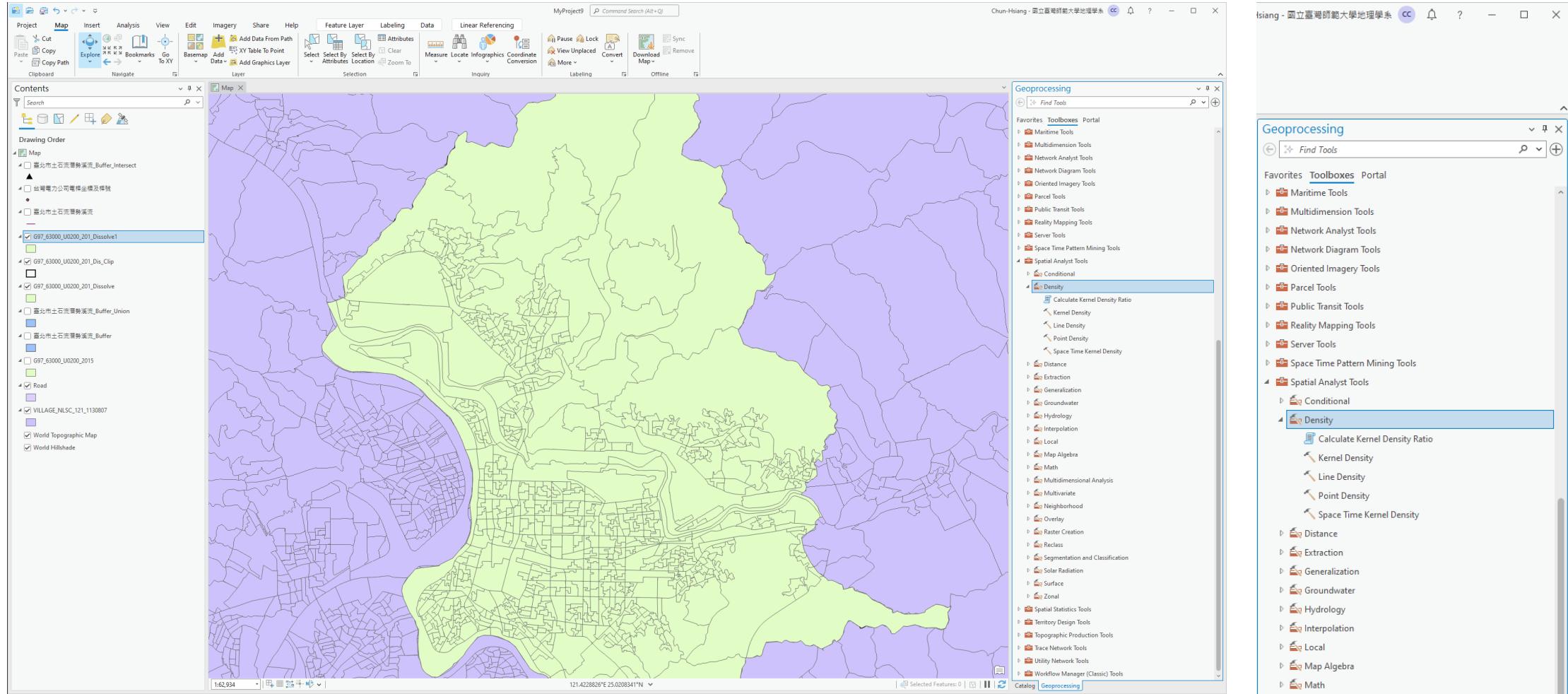
The screenshot illustrates a workflow for dissolving land parcels based on specific criteria. On the left, the ArcGIS Pro interface shows a map of land parcels with various buffer zones and a dissolved feature. The 'Geoprocessing' pane on the right details the 'Dissolve' tool settings:

- Input Features:** G97_63000_U0200_201_Dissolve
- Output Feature Class:** G97_63000_U0200_201_Dissolve1
- Dissolve Fields:** CODE2 [G97_63000_U0200_201_Dissolve.CODE2]
- Statistics Fields:**
 - Field: U0200_201_Dissolve.DFArea, Statistic Type: Sum
 - Field: Proportion, Statistic Type: Sum
- Checkboxes:** Create multipart features (checked), Unsplit lines (unchecked)

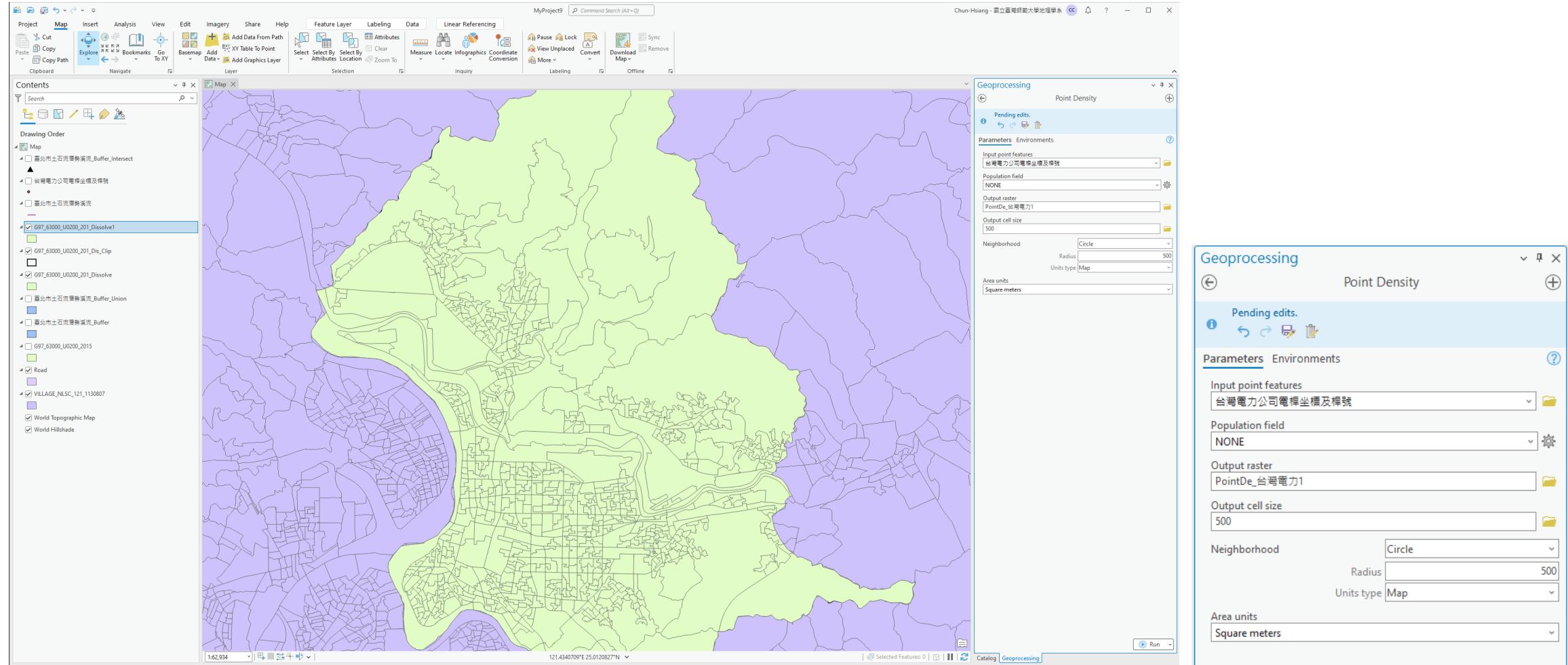
The results of the dissolve operation are shown in the table below:

OBJECTID *	Shape *	CODE2 *	Shape_Length	Shape_Area	DFArea	Proportion
3	Polygon ZM	A6310-01	35802.558717	1673771.397303	2.864118	0.17075
2	Polygon ZM	A6310-01	36235.530337	2301278.798187	2.793668	0.109771
5	Polygon ZM	A6312-07	21967.873758	5451411.026669	1.15442	0.211765
4	Polygon ZM	A6308-04	28960.226081	1436140.9352	0.785623	0.057047
6	Polygon ZM	A6309-39	18175.852091	731849.627884	0.497722	0.067941
1	Polygon ZM	A6311-01	38482.47927	2440209.43391	0.44208	0.081114
7	Polygon ZM	A6311-40	5067.135836	1571158.564322	0.351486	0.232711
8	Polygon ZM	A6312-41	13376.637082	2661713.94957	0.302843	0.113778
9	Polygon ZM	A6302-66	7982.7238	170215.573099	0.222893	0.131097
12	Polygon ZM	A6302-00	5912.3869	1551773.097917	0.221113	0.142307
21	Polygon ZM	A6312-02	22404.940563	6846769.70167	0.220198	0.032161
12	Polygon ZM	A6311-02	9776.167891	192764.503882	0.183311	0.095095
13	Polygon ZM	A6311-45	12189.386838	2664028.540184	0.181172	0.080007
26	Polygon ZM	A6304-02	4760.963838	94195.894915	0.150386	0.159652
153	Polygon ZM	A6302-78	9607.669741	1707169.357237	0.199511	0.091878
634	Polygon ZM	A6309-38	20888.8864	907671.519863	0.124433	0.124433
17	Polygon ZM	A6311-17	13066.01269	3220615.787599	0.066294	0.026794
18	Polygon ZM	A6312-06	2328.184118	184508.267254	0.061715	0.334486
19	Polygon ZM	A6311-59	10170.099947	2267933.025032	0.058446	0.025771
20	Polygon ZM	A6308-67	3617.274493	190716.113832	0.05796	0.303905
20	Polygon ZM	A6311-59	10170.099947	2267933.025032	0.058446	0.025771

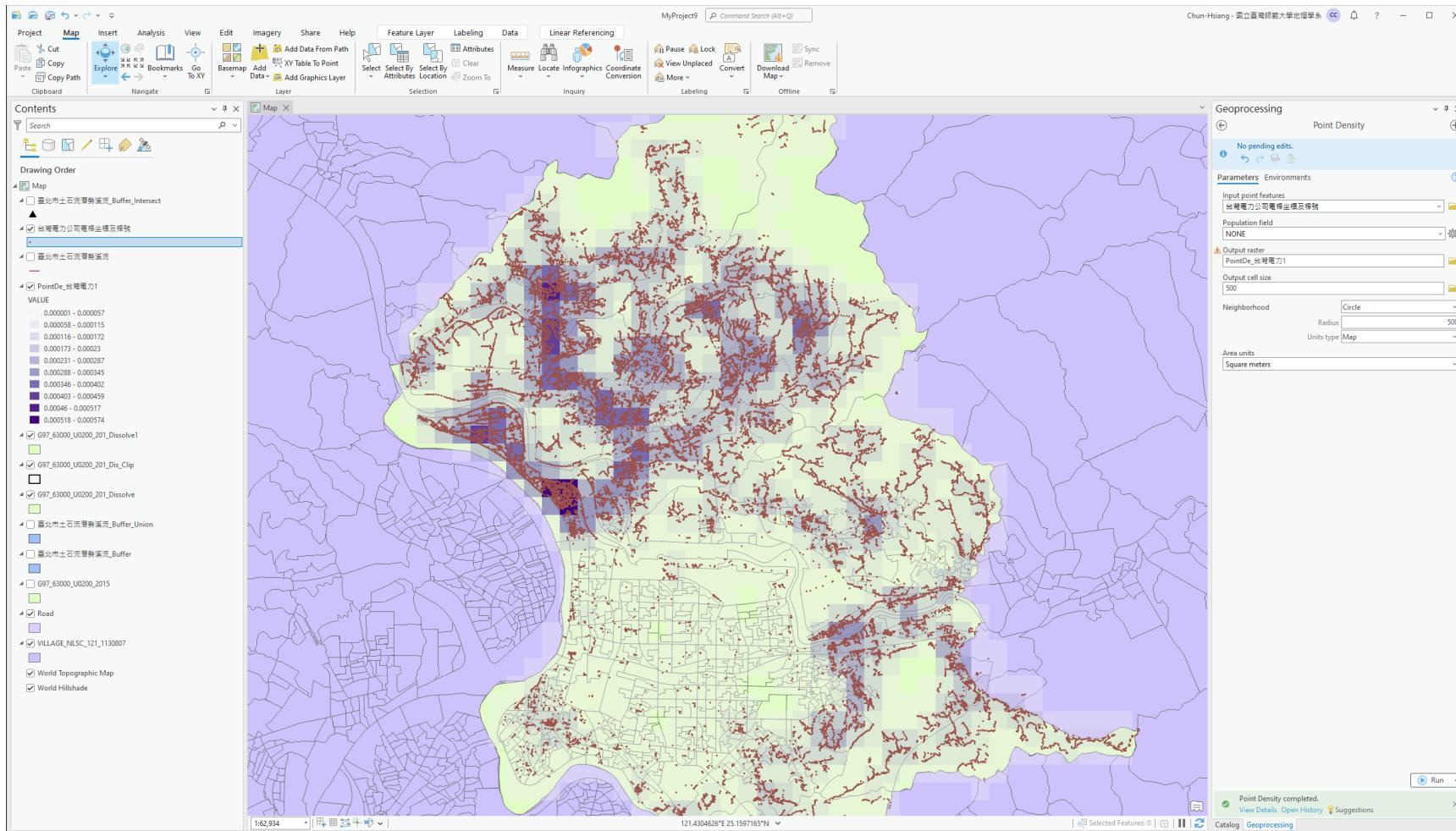
Point Density for Calculating UP Density



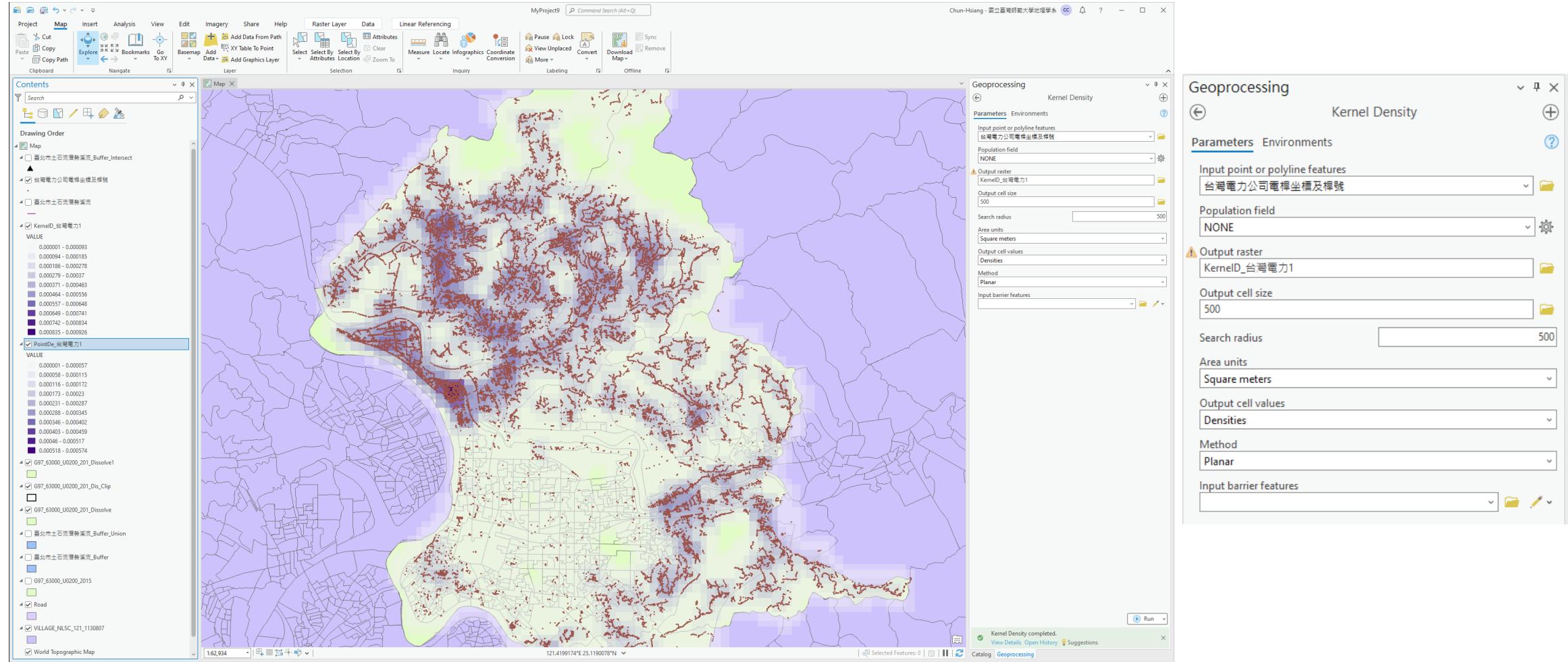
Point Density for Calculating UP Density



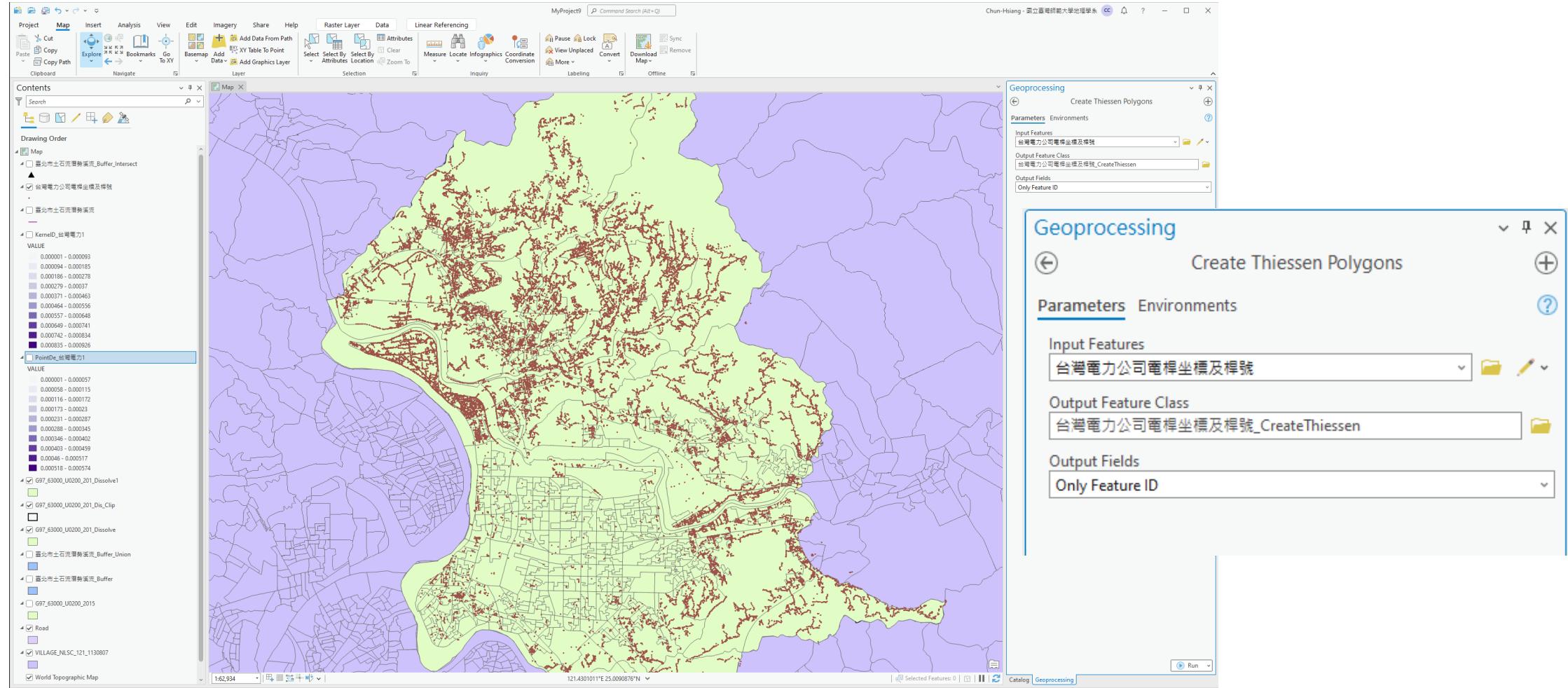
Point Density for Calculating UP Density



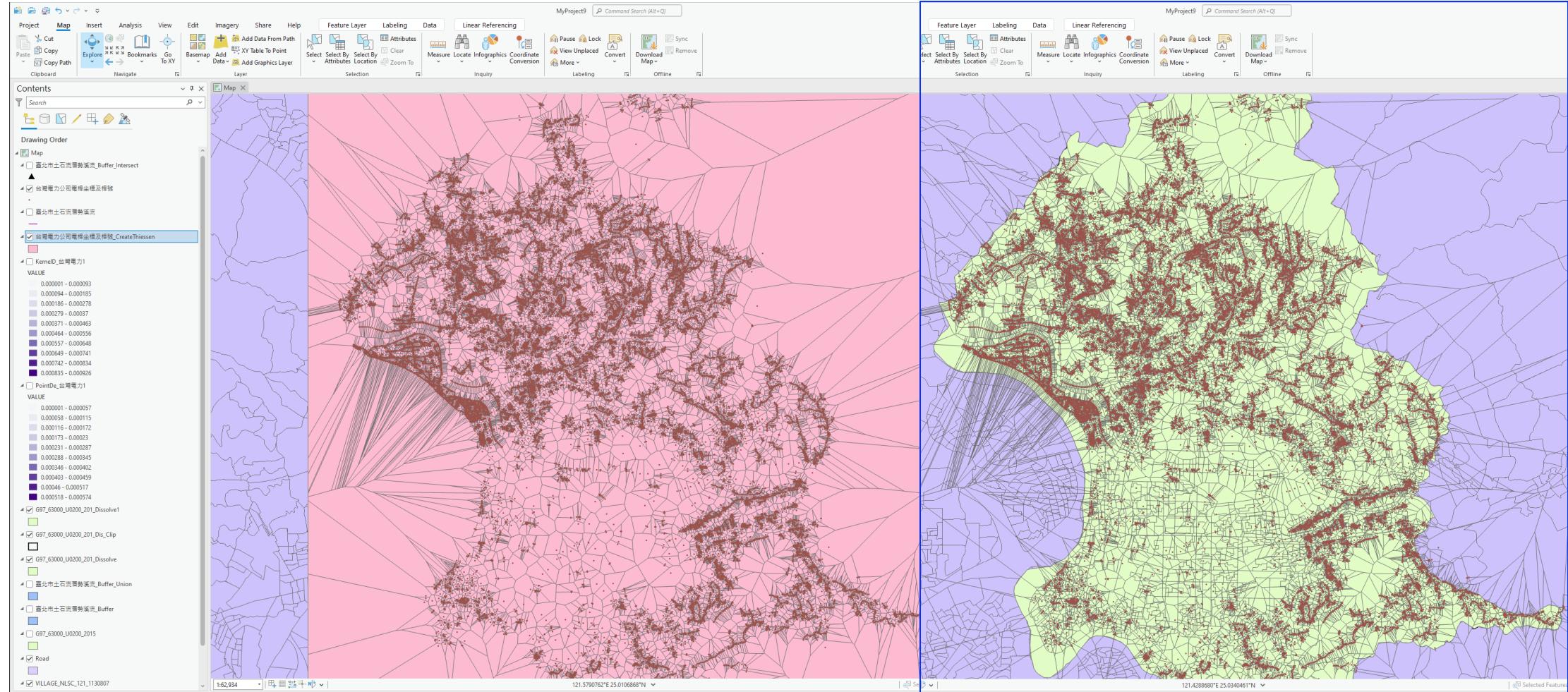
Kernel Density for Calculating UP Density



Create Thiessen Polygon for UP



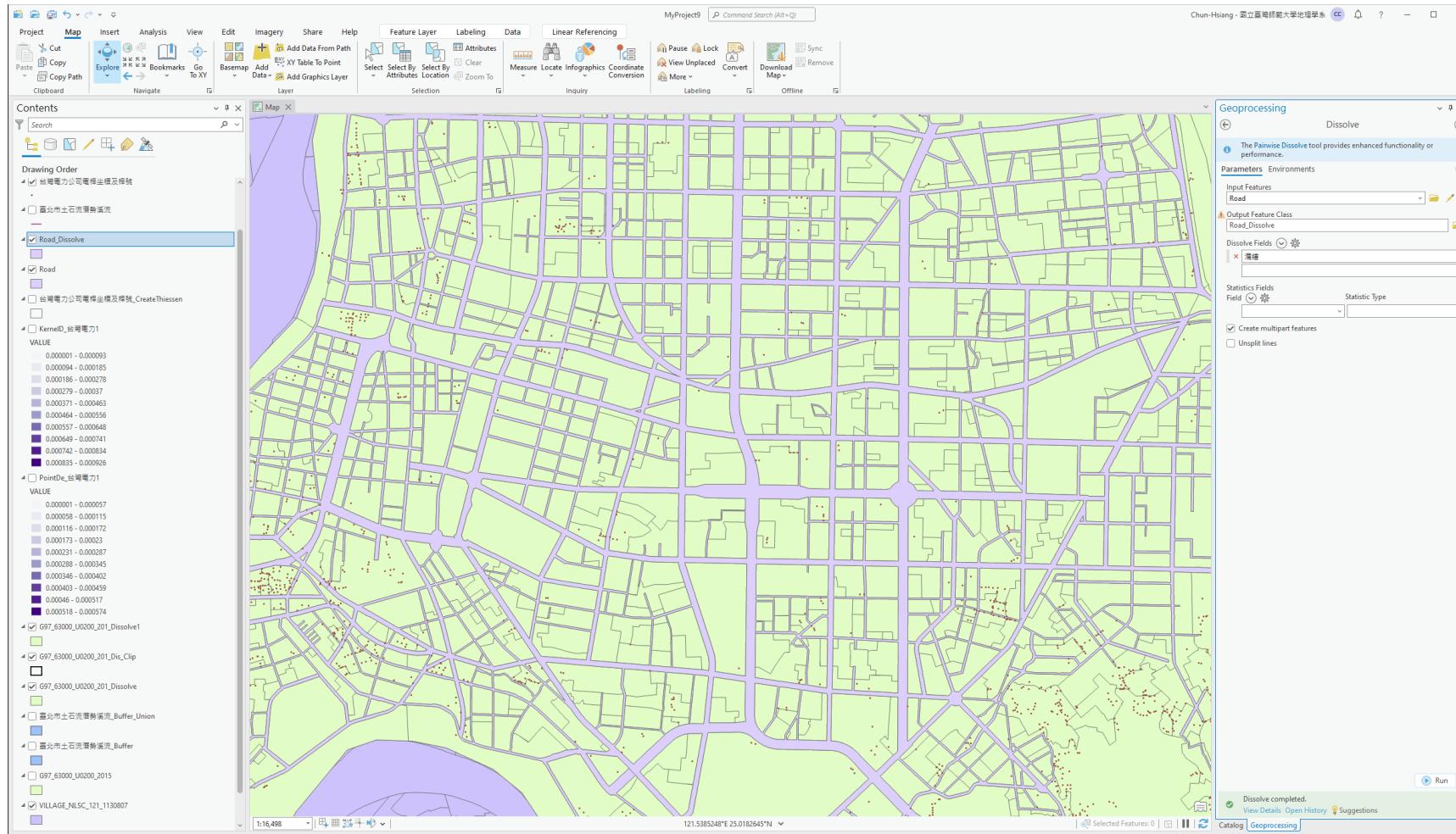
Create Thiessen Polygon for UP



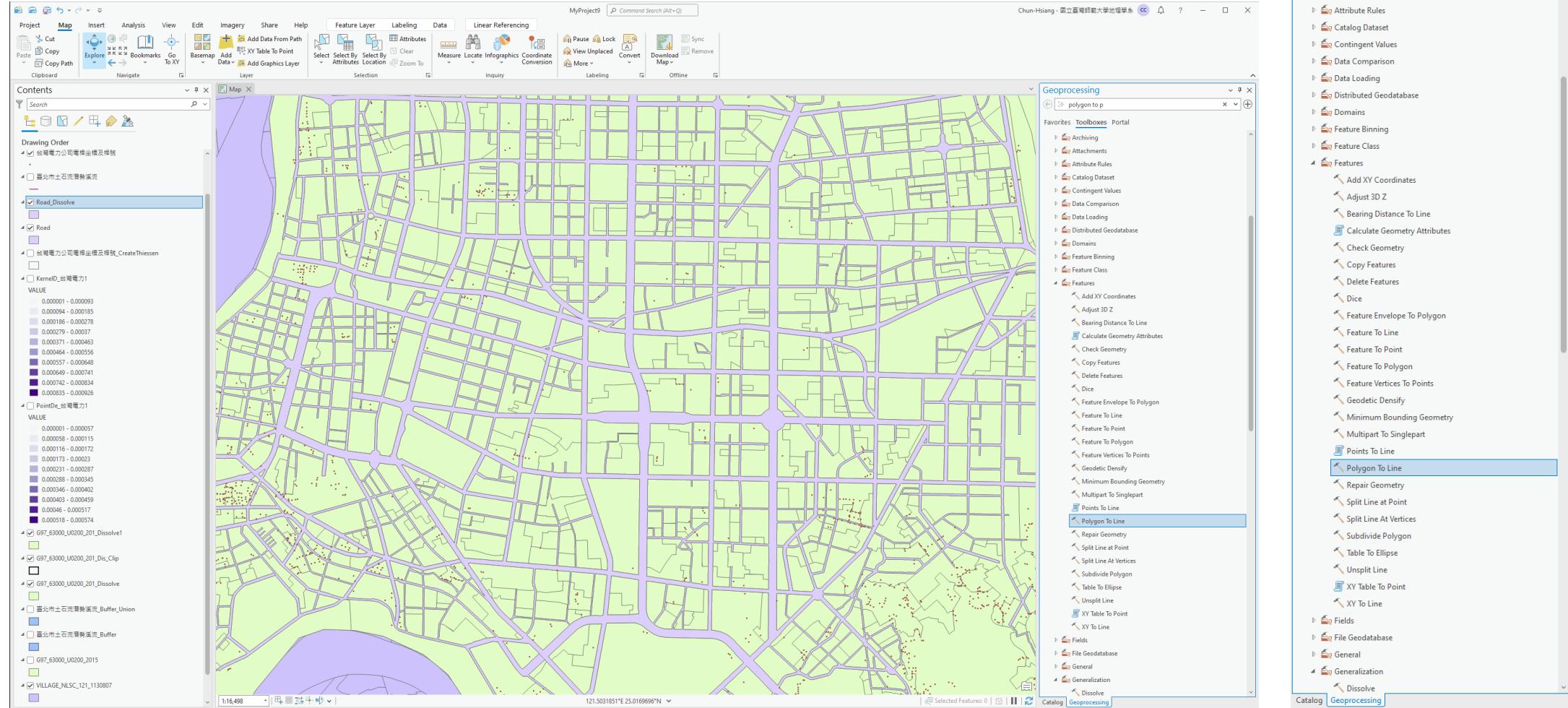
Dissolve Road All Together by “漏繪”

The screenshot shows the ArcGIS Pro interface. On the left is the Contents pane, which lists various layers including 'Road' (selected), 'PointDe_台電電力1' (unchecked), and several dissolved road layers like 'G97_63000_U0200_201_Dissolve1'. The main Map view displays a dense network of roads in purple and green. To the right is the Geoprocessing pane, specifically the 'Dissolve' tool. The 'Parameters' tab is selected, showing the 'Input Features' set to 'Road', 'Output Feature Class' set to 'Road_Dissolve', and 'Dissolve Fields' set to '漏繪' (Leohui). The 'Statistics Fields' section is collapsed. At the bottom of the pane, two checkboxes are checked: 'Create multipart features' and 'Unsplit lines'.

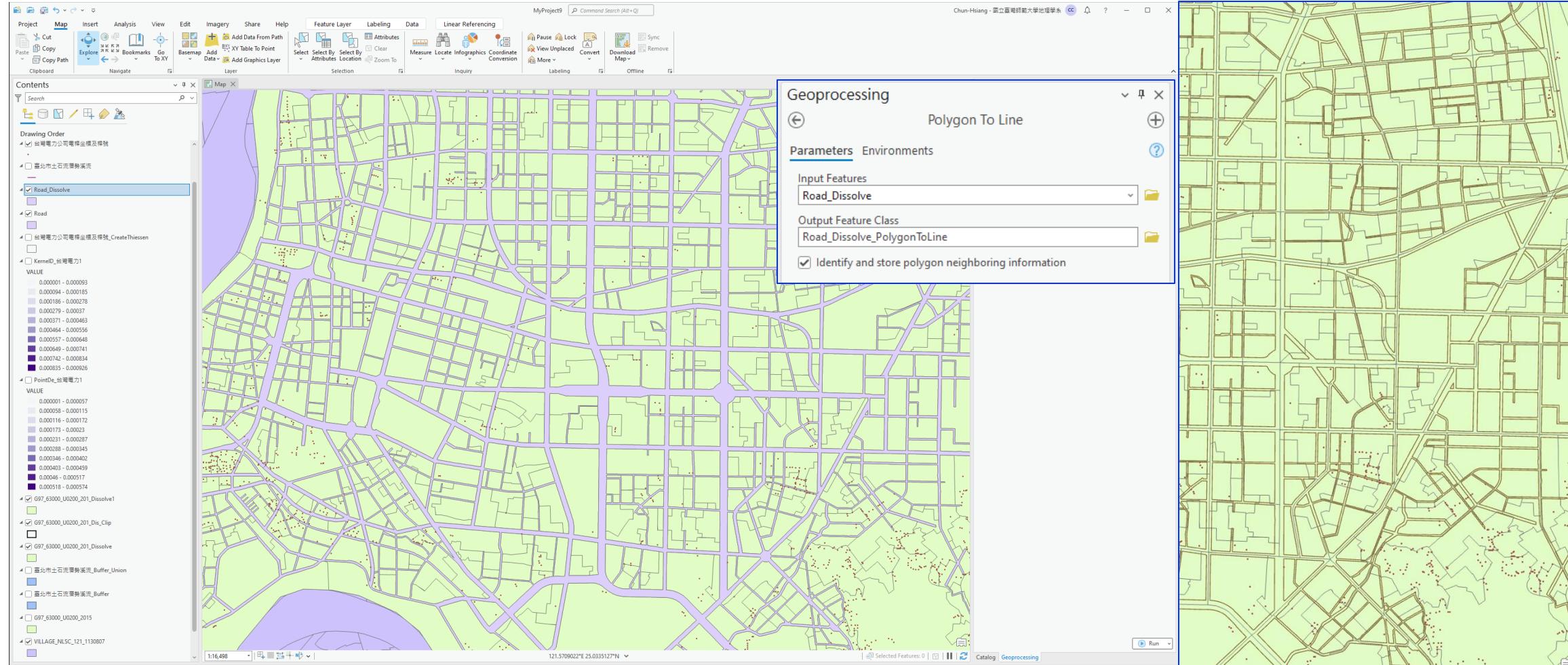
Dissolve Road All Together by “漏繪”



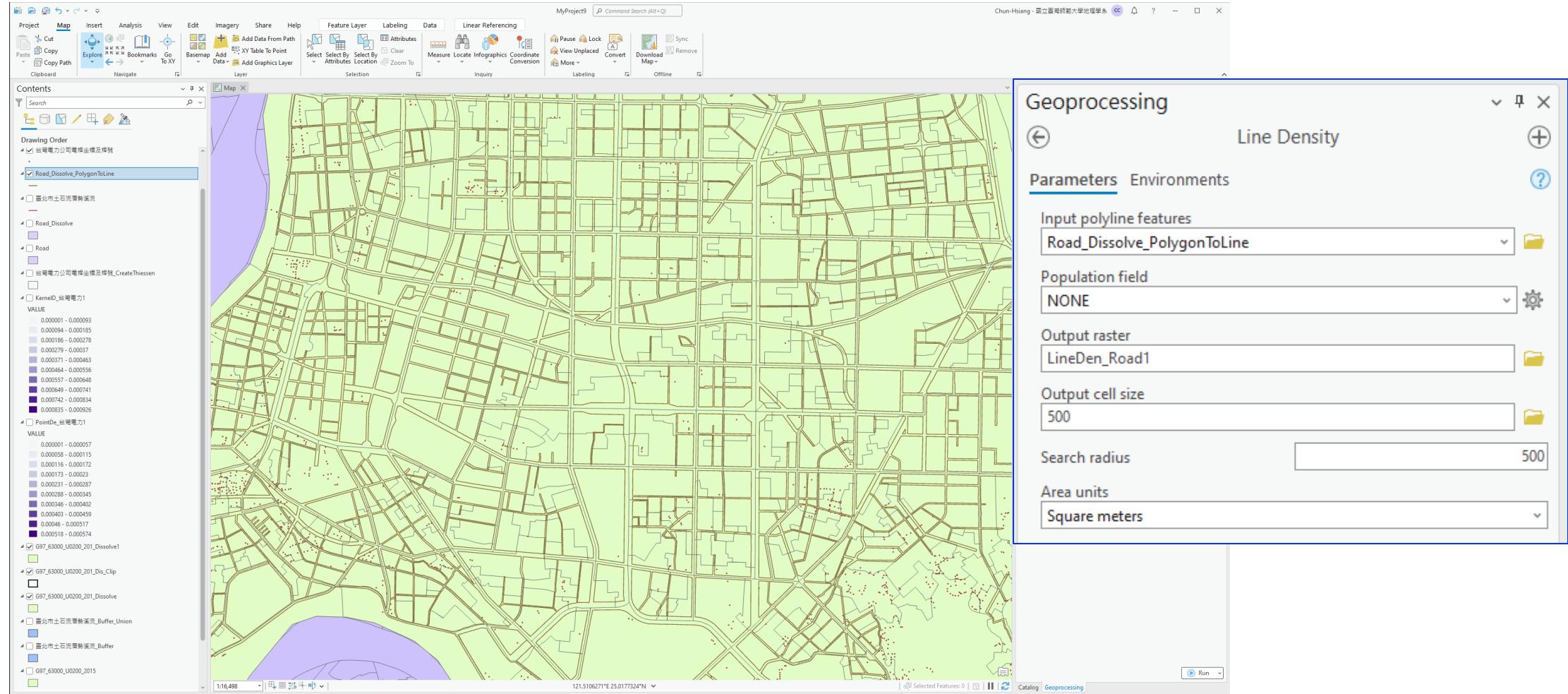
Polygon To Line for Converting Dissolved Road into a Polyline Feature



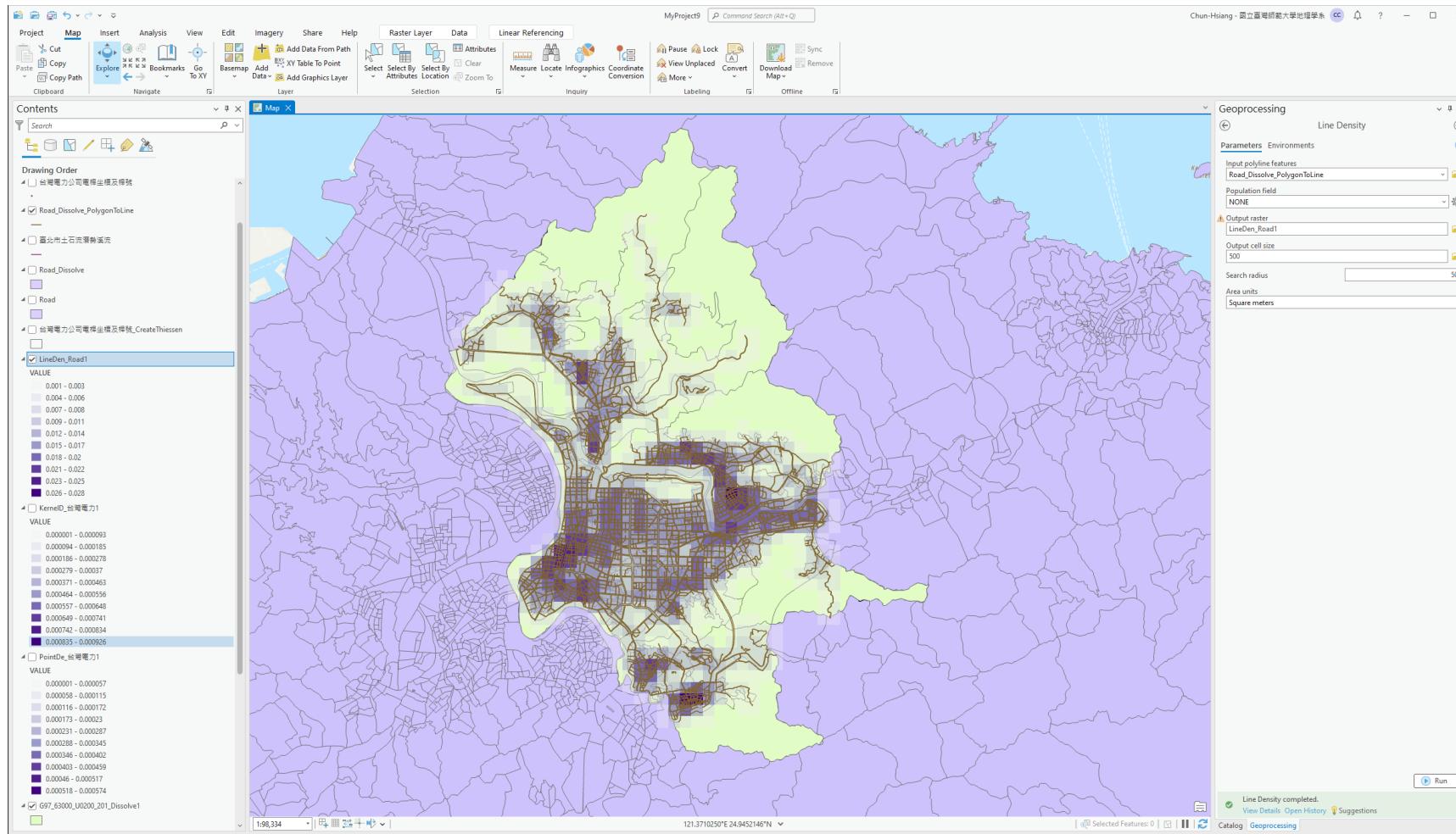
Polygon To Line for Converting Dissolved Road into a Polyline Feature



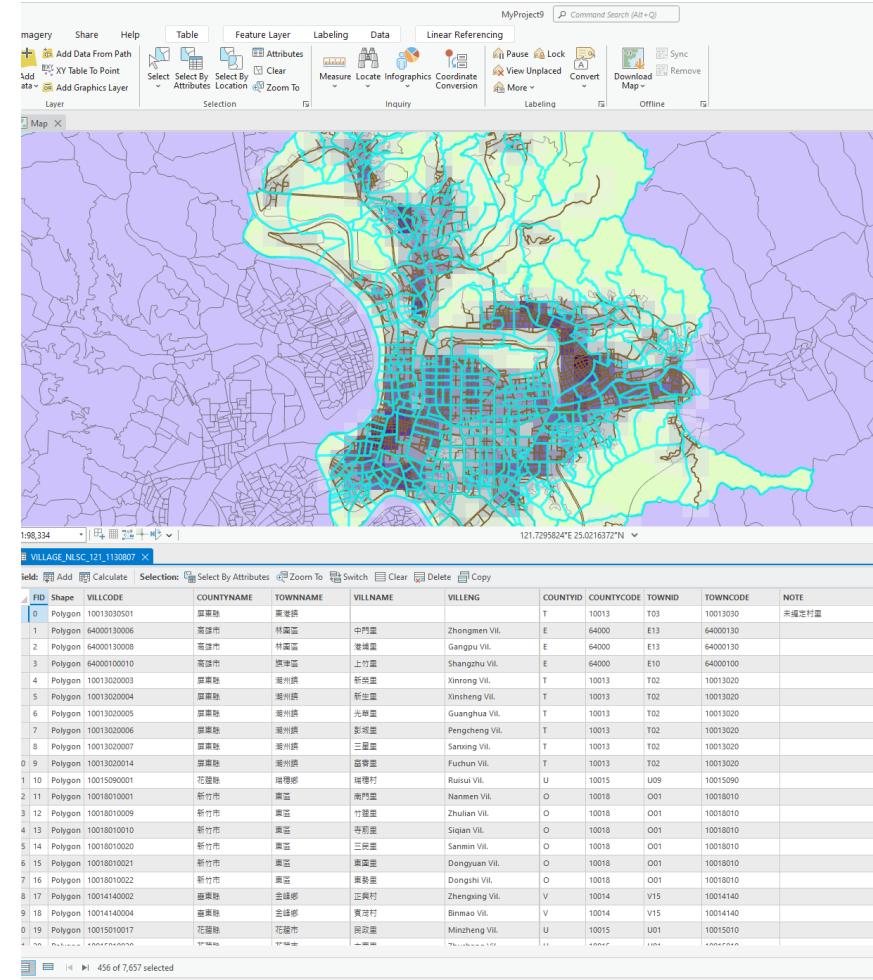
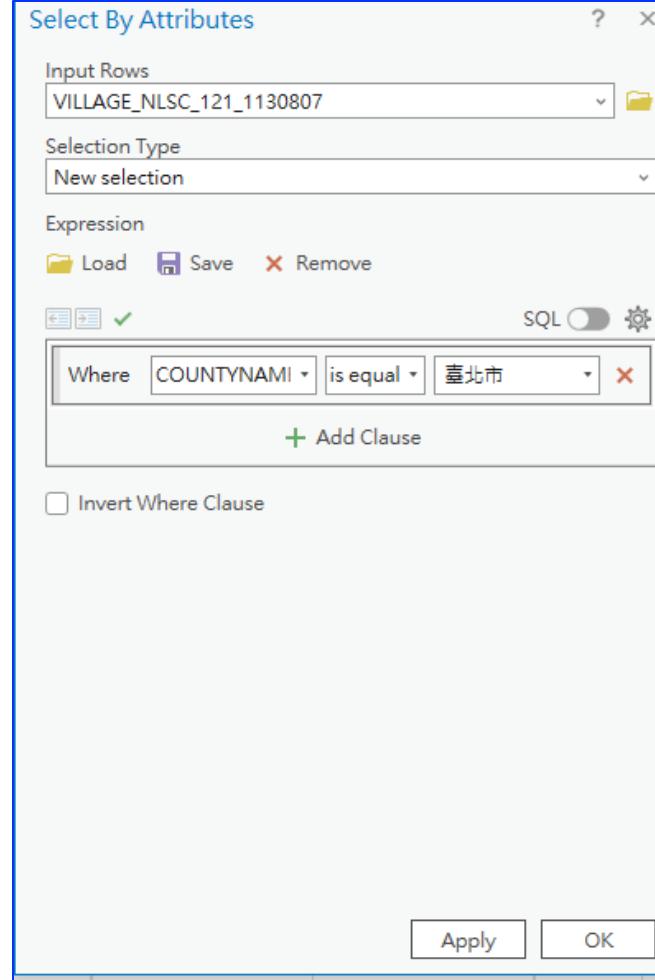
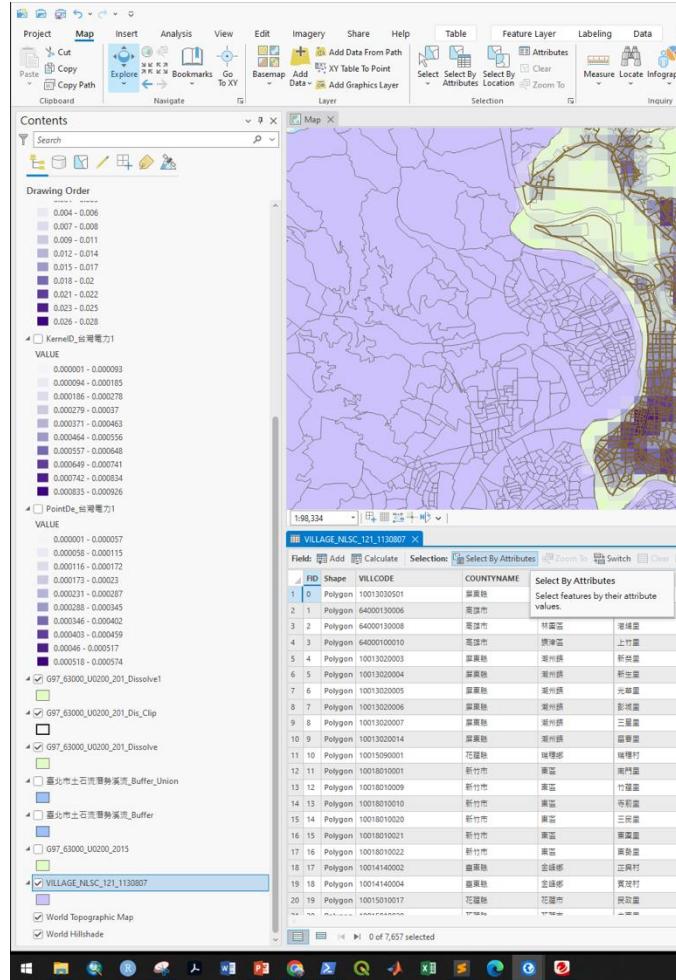
Line Density for Calculating Road Density



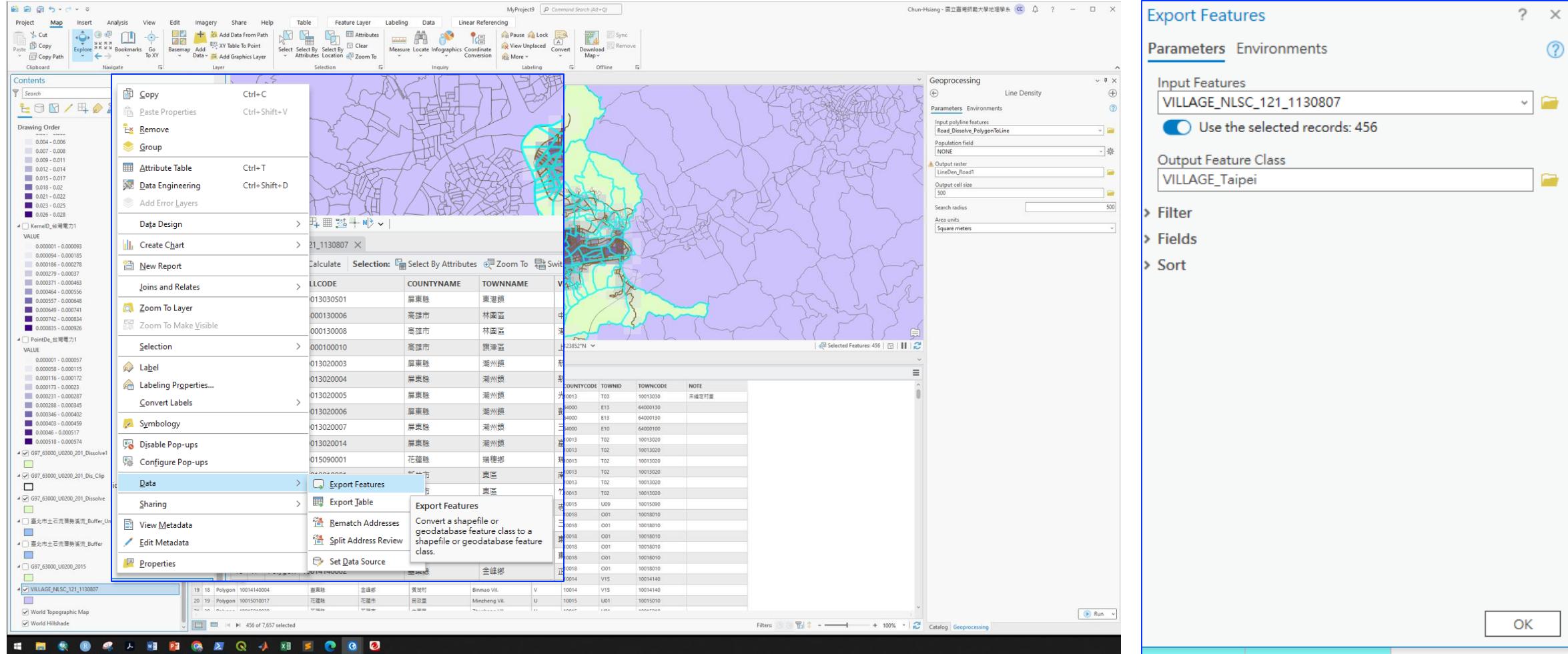
Line Density for Calculating Road Density



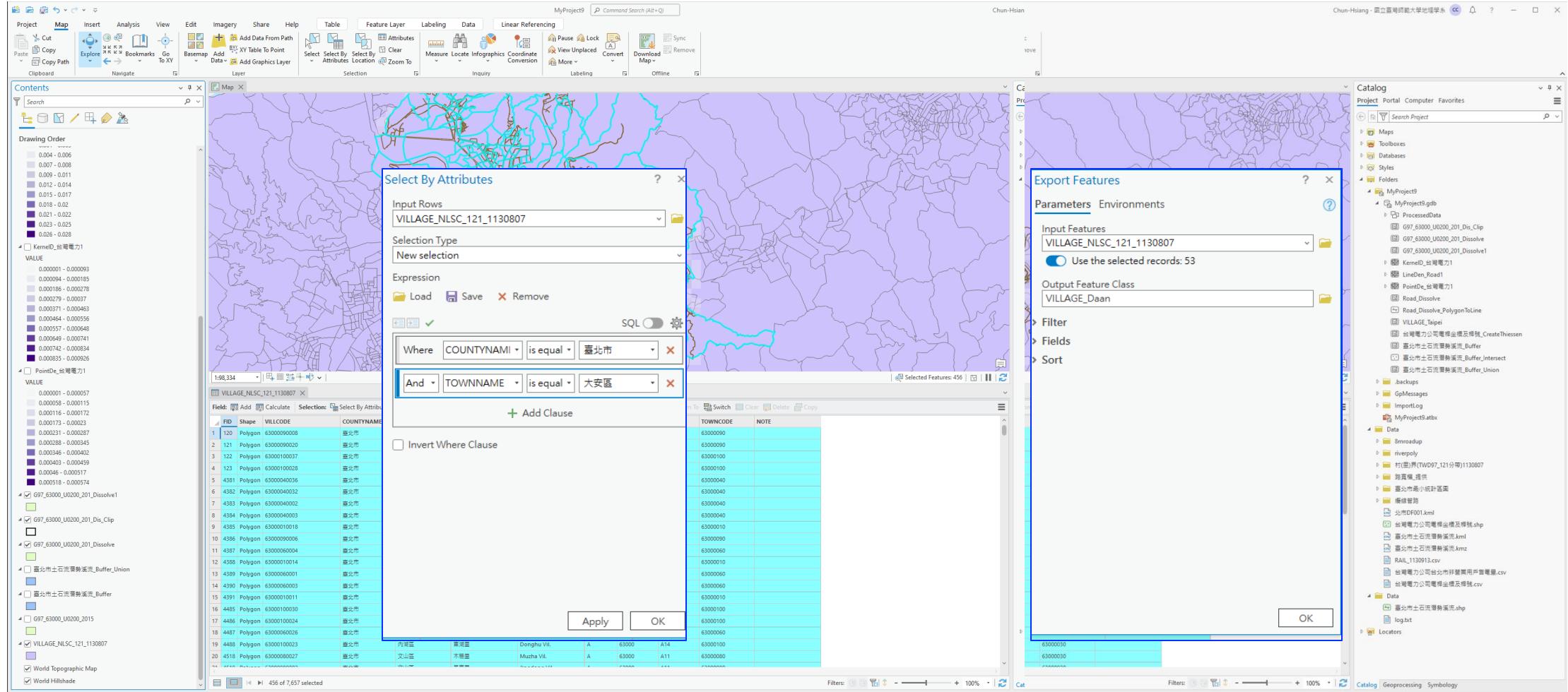
Select by Attribute and Export Features to Export Daan from Taipei Village Layer



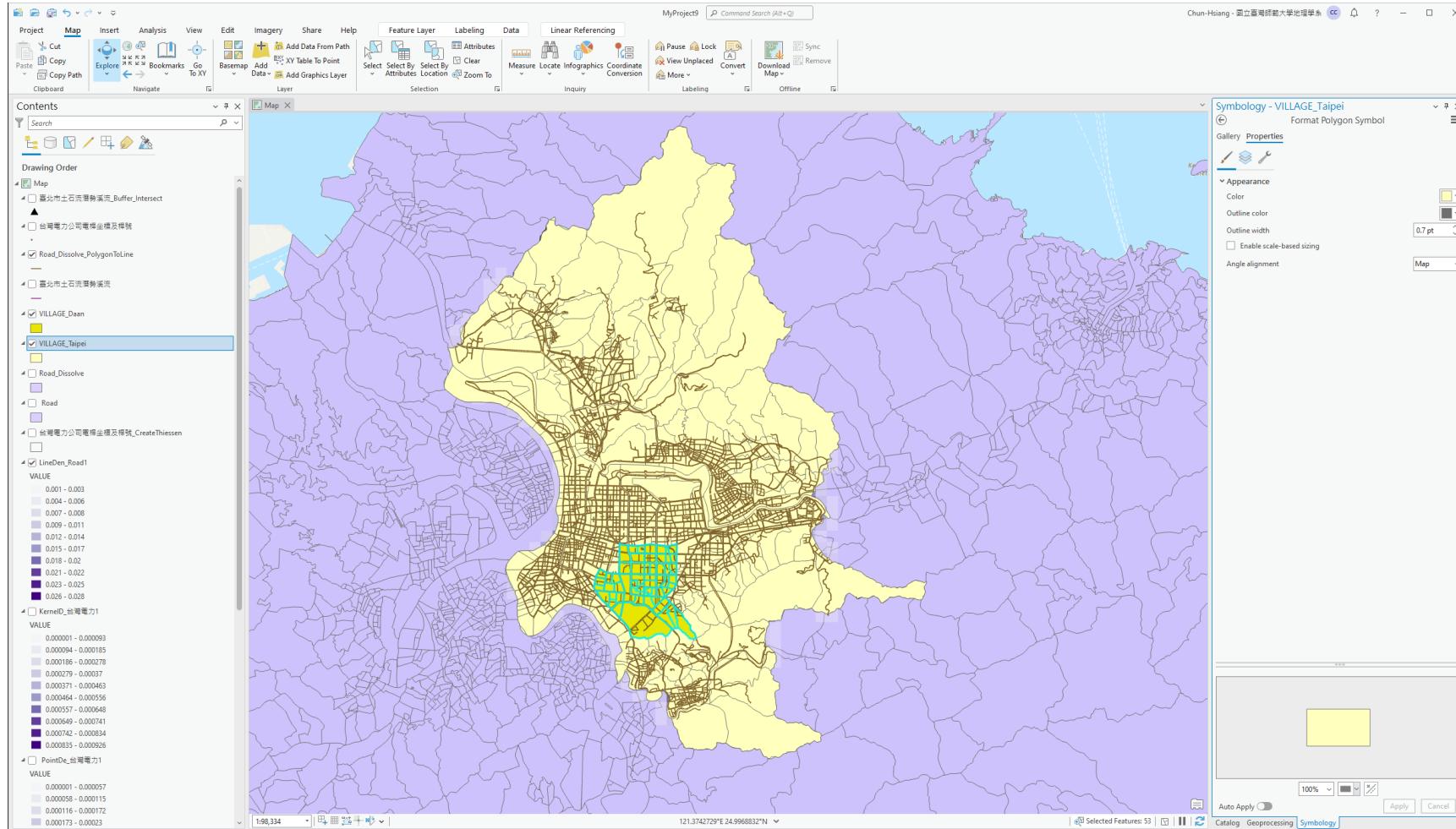
Select by Attribute and Export Features to Export Daan from Taipei Village Layer



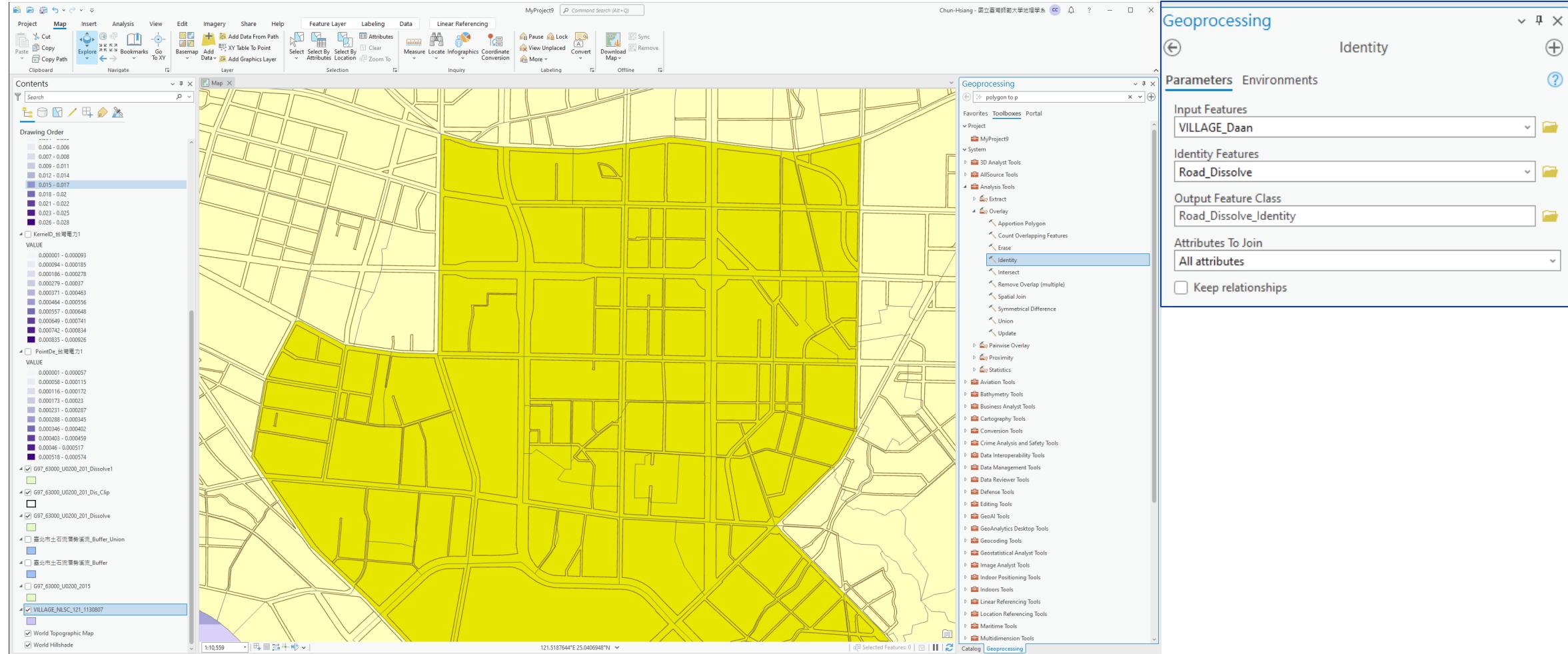
Select by Attribute and Export Features to Export Taipei City from Taipei Village Layer



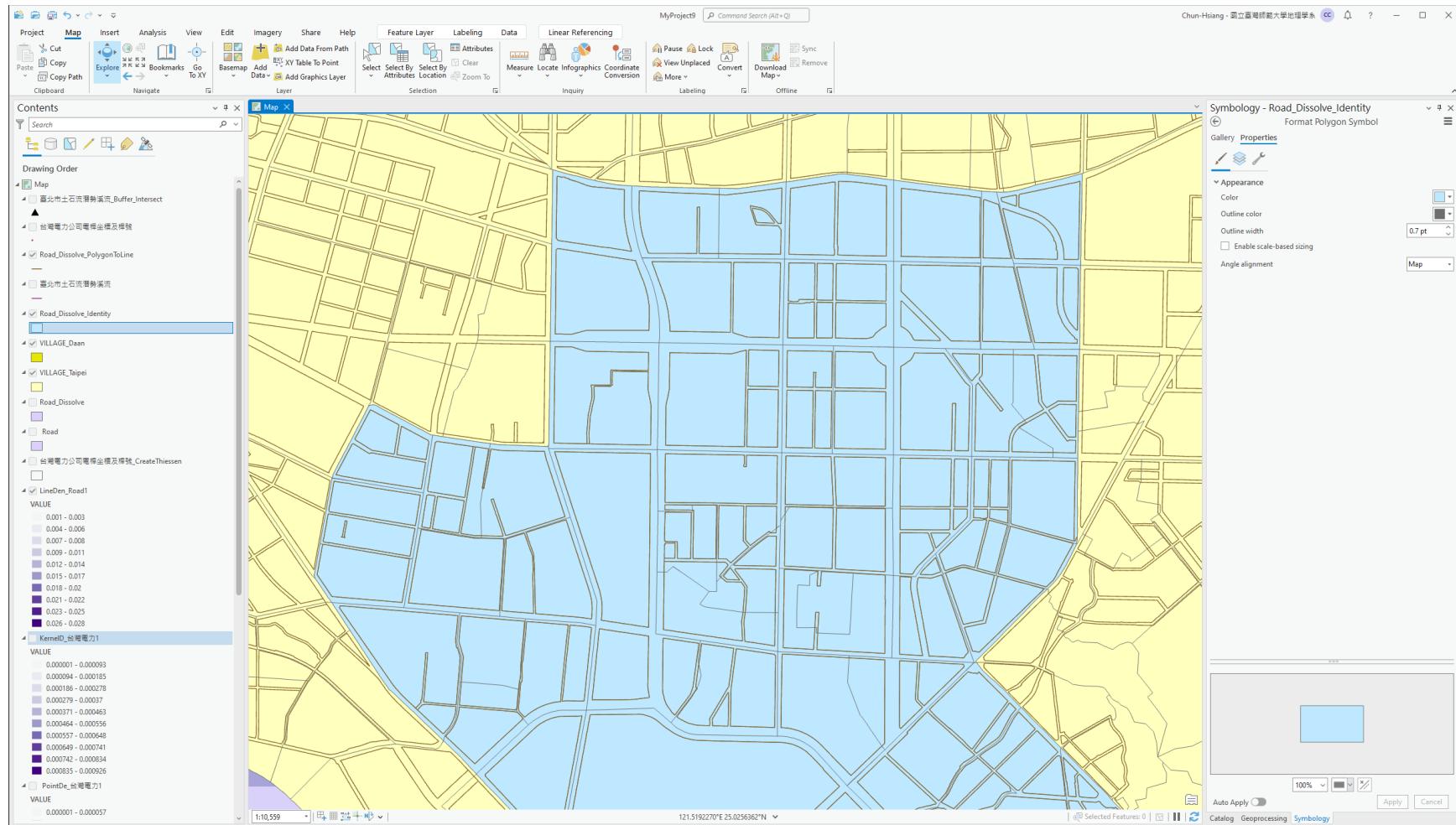
Select by Attribute and Export Features to Export Taipei City from Taipei Village Layer



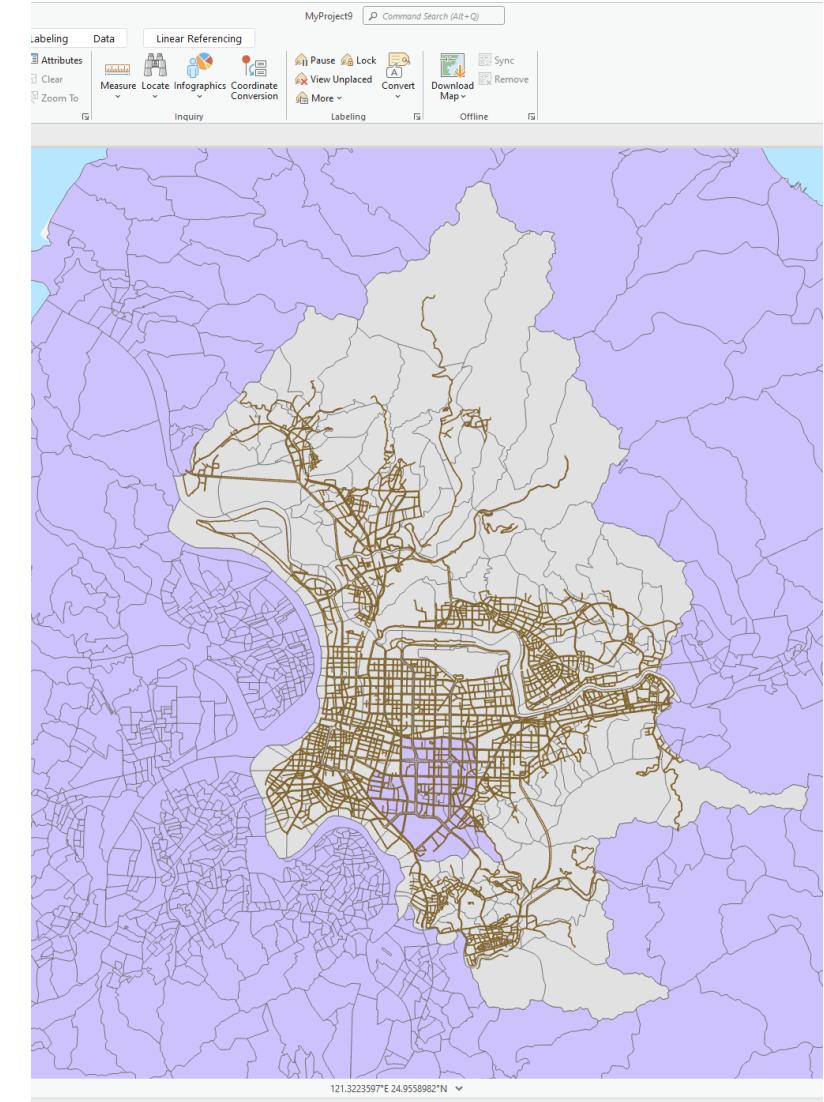
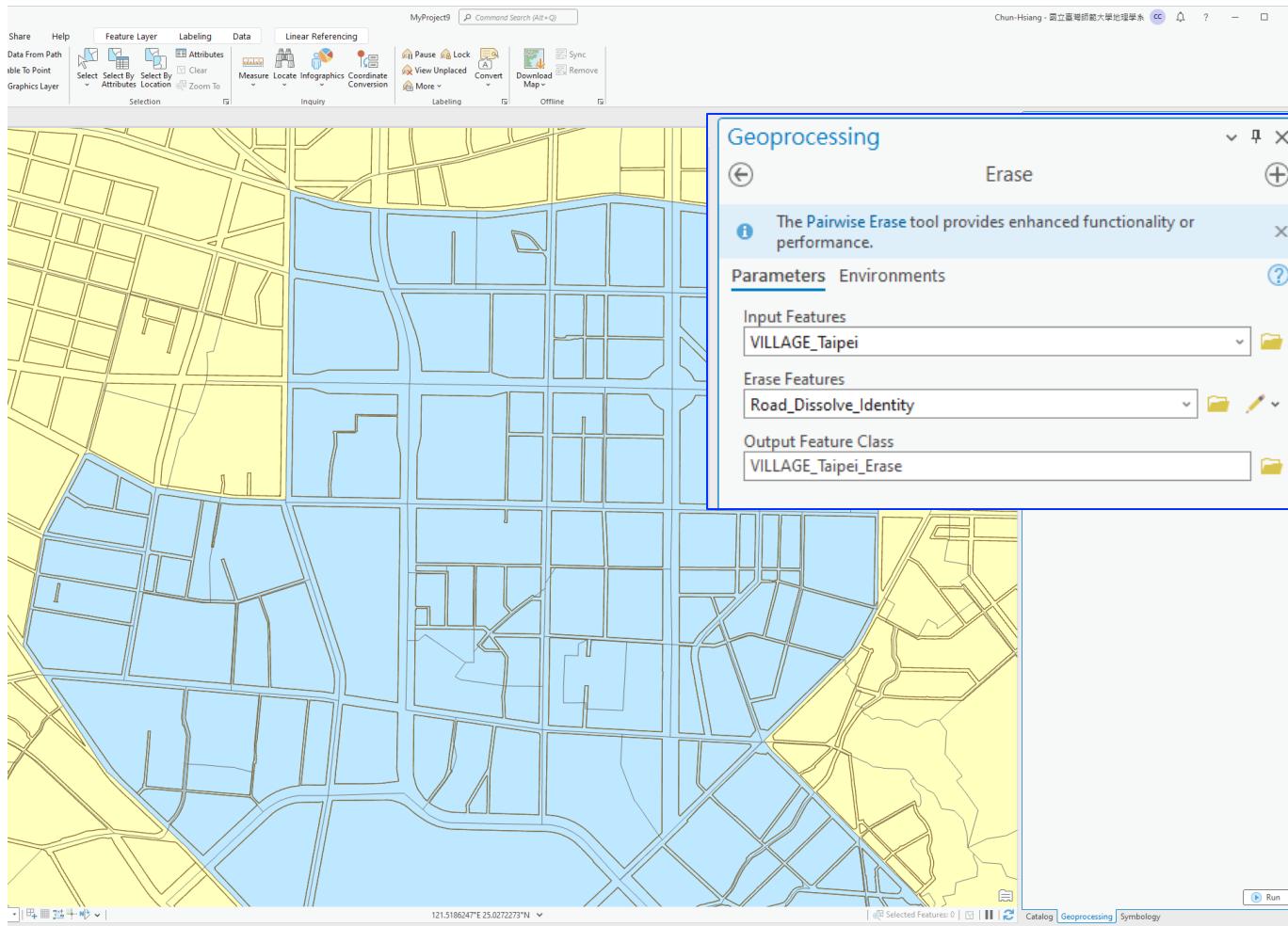
Identify Dissolved Road by Daan Layer



Identify Dissolved Road by Daan Layer



Erase Identified Daan Layer by Taipei City Layer



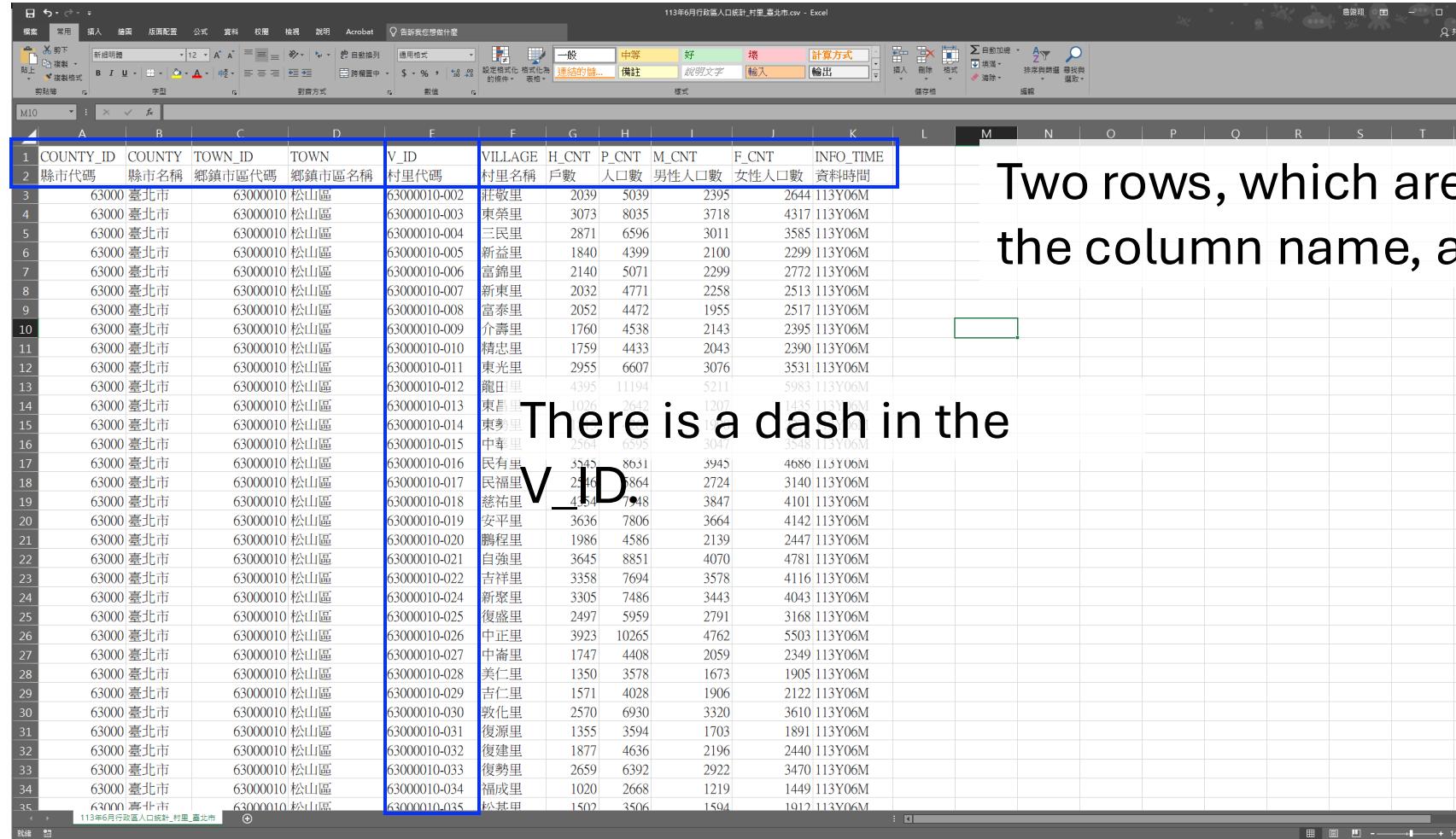
Symbology :: Polygon

Excel/ Join Features/ Single Symbol/ Unique Values/ Graduated Colors/
Bivariate Colors/ Unclassed Colors/ Proportional Symbols/ Graduated
Symbols/ Dot Density/ Bar Chart/ Pie Chart/ Stacked Chart

Procedure for Symbology

- 1) **Excel :: Data Preprocessing for Population Data**
- 2) **GeoAnalytics Desktop Tools/Join Features from POP data to Taipei Village Layer**
- 3) **Symbology :: Single Symbol**
- 4) **Symbology :: Unique Values with District**
- 5) **Symbology :: Graduated Colors with P_CNT**
- 6) **Symbology :: Bivariate Colors with P_CNT**
- 7) **Symbology :: Unclassed Colors with P_CNT**
- 8) **Symbology :: Proportional Symbols for Polygon with P_CNT**
- 9) **Symbology :: Dot Density for Polygon (M/F)**
- 10) **Symbology :: Bar Chart for Polygon (M/F)**
- 11) **Symbology :: Pie Chart for Polygon (M/F)**
- 12) **Symbology :: Stacked Chart for Polygon (M/F)**

Excel :: Data Preprocessing for Population Data

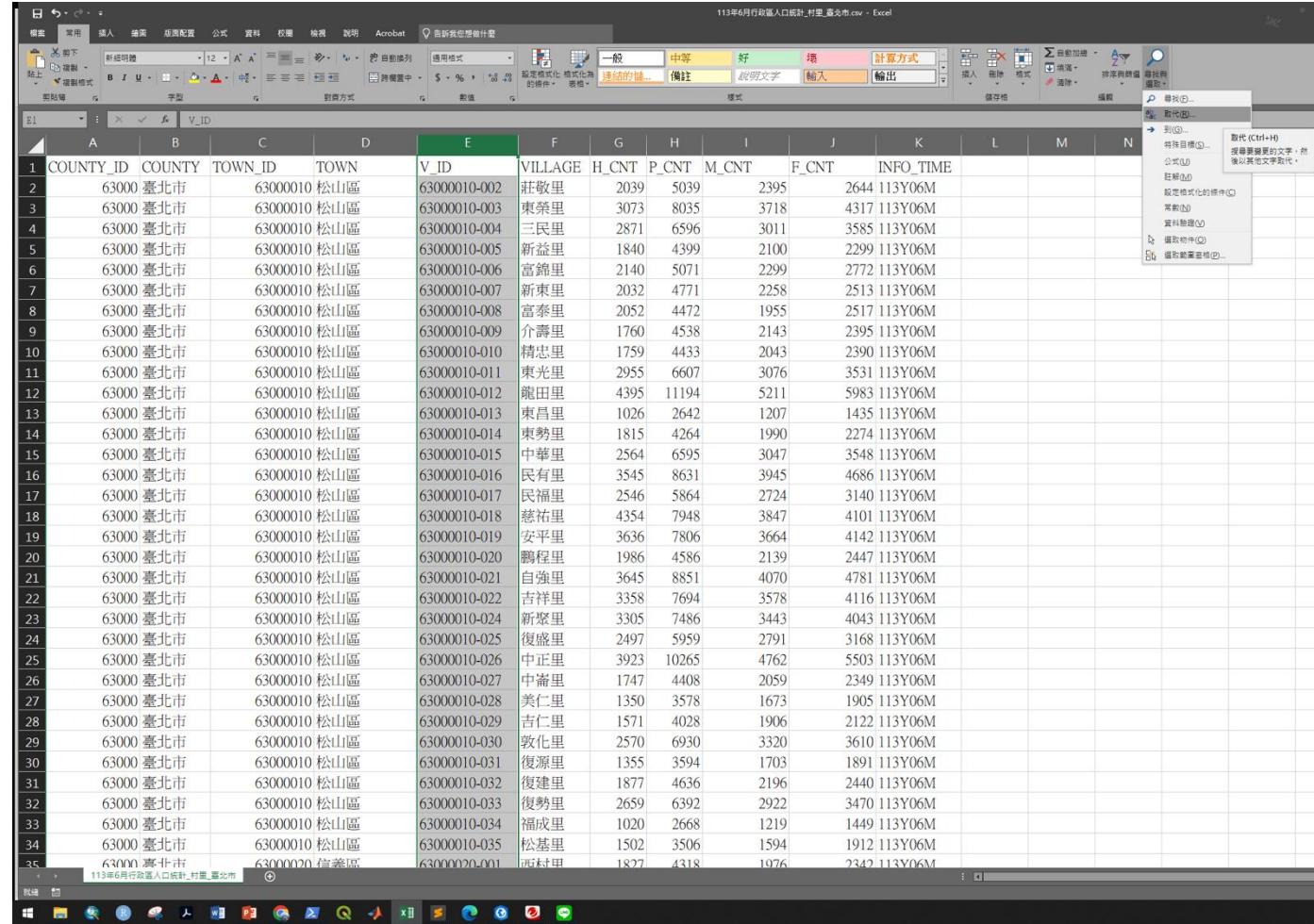


COUNTY_ID	COUNTY	TOWN_ID	TOWN	V_ID	VILLAGE	H_CNT	P_CNT	M_CNT	F_CNT	INFO_TIME
縣市代碼	縣市名稱	鄉鎮市區代碼	鄉鎮市區名稱	村里代碼	村里名稱	戶數	人口數	男性人口數	女性人口數	資料時間
63000	臺北市	63000010	松山區	63000010-002	莊敬里	2039	5039	2395	2644	113Y06M
63000	臺北市	63000010	松山區	63000010-003	東榮里	3073	8035	3718	4317	113Y06M
63000	臺北市	63000010	松山區	63000010-004	三民里	2871	6596	3011	3585	113Y06M
63000	臺北市	63000010	松山區	63000010-005	新益里	1840	4399	2100	2299	113Y06M
63000	臺北市	63000010	松山區	63000010-006	富錦里	2140	5071	2299	2772	113Y06M
63000	臺北市	63000010	松山區	63000010-007	新東里	2032	4771	2258	2513	113Y06M
63000	臺北市	63000010	松山區	63000010-008	富泰里	2052	4472	1955	2517	113Y06M
63000	臺北市	63000010	松山區	63000010-009	介壽里	1760	4538	2143	2395	113Y06M
63000	臺北市	63000010	松山區	63000010-010	精忠里	1759	4433	2043	2390	113Y06M
63000	臺北市	63000010	松山區	63000010-011	東光里	2955	6607	3076	3531	113Y06M
63000	臺北市	63000010	松山區	63000010-012	龍田里	4395	11194	5211	5983	113Y06M
63000	臺北市	63000010	松山區	63000010-013	東昌里	1026	2642	1207	1435	113Y06M
63000	臺北市	63000010	松山區	63000010-014	東勢里	1900	4935	2284	2551	113Y06M
63000	臺北市	63000010	松山區	63000010-015	中華里	2561	6535	3041	3545	113Y06M
63000	臺北市	63000010	松山區	63000010-016	民有里	3545	8631	3945	4686	113Y06M
63000	臺北市	63000010	松山區	63000010-017	民福里	2546	5864	2724	3140	113Y06M
63000	臺北市	63000010	松山區	63000010-018	慈祐里	4354	7948	3847	4101	113Y06M
63000	臺北市	63000010	松山區	63000010-019	安平里	3636	7806	3664	4142	113Y06M
63000	臺北市	63000010	松山區	63000010-020	鵬程里	1986	4586	2139	2447	113Y06M
63000	臺北市	63000010	松山區	63000010-021	自強里	3645	8851	4070	4781	113Y06M
63000	臺北市	63000010	松山區	63000010-022	吉祥里	3358	7694	3578	4116	113Y06M
63000	臺北市	63000010	松山區	63000010-024	新寮里	3305	7486	3443	4043	113Y06M
63000	臺北市	63000010	松山區	63000010-025	復盛里	2497	5959	2791	3168	113Y06M
63000	臺北市	63000010	松山區	63000010-026	中正里	3923	10265	4762	5503	113Y06M
63000	臺北市	63000010	松山區	63000010-027	中崙里	1747	4408	2059	2349	113Y06M
63000	臺北市	63000010	松山區	63000010-028	美仁里	1350	3578	1673	1905	113Y06M
63000	臺北市	63000010	松山區	63000010-029	吉仁里	1571	4028	1906	2122	113Y06M
63000	臺北市	63000010	松山區	63000010-030	敦化里	2570	6930	3320	3610	113Y06M
63000	臺北市	63000010	松山區	63000010-031	復源里	1355	3594	1703	1891	113Y06M
63000	臺北市	63000010	松山區	63000010-032	復建里	1877	4636	2196	2440	113Y06M
63000	臺北市	63000010	松山區	63000010-033	復勢里	2659	6392	2922	3470	113Y06M
63000	臺北市	63000010	松山區	63000010-034	福成里	1020	2668	1219	1449	113Y06M
63000	臺北市	63000010	松山區	63000010-035	松其里	1502	3506	1594	1912	113Y06M

Two rows, which are used to show the column name, are redundant.

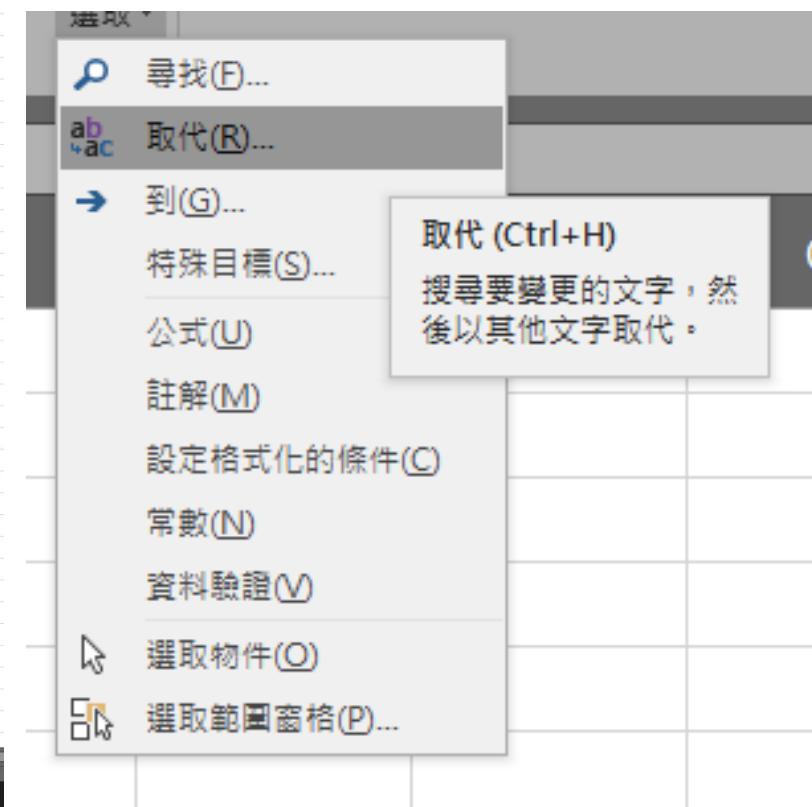
There is a dash in the V_ID

Excel :: Data Preprocessing for Population Data



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	COUNTY_ID	COUNTY	TOWN_ID	TOWN	V_ID	VILLAGE	H_CNT	P_CNT	M_CNT	F_CNT	INFO_TIME			
2	63000	臺北市	63000010	松山區	63000010-002	莊敬里	2039	5039	2395	2644	113Y06M			
3	63000	臺北市	63000010	松山區	63000010-003	東榮里	3073	8035	3718	4317	113Y06M			
4	63000	臺北市	63000010	松山區	63000010-004	三民里	2871	6596	3011	3585	113Y06M			
5	63000	臺北市	63000010	松山區	63000010-005	新益里	1840	4399	2100	2299	113Y06M			
6	63000	臺北市	63000010	松山區	63000010-006	富錦里	2140	5071	2299	2772	113Y06M			
7	63000	臺北市	63000010	松山區	63000010-007	新東里	2032	4771	2258	2513	113Y06M			
8	63000	臺北市	63000010	松山區	63000010-008	富泰里	2052	4472	1955	2517	113Y06M			
9	63000	臺北市	63000010	松山區	63000010-009	介壽里	1760	4538	2143	2395	113Y06M			
10	63000	臺北市	63000010	松山區	63000010-010	精忠里	1759	4433	2043	2390	113Y06M			
11	63000	臺北市	63000010	松山區	63000010-011	東光里	2955	6607	3076	3531	113Y06M			
12	63000	臺北市	63000010	松山區	63000010-012	龍田里	4395	11194	5211	5983	113Y06M			
13	63000	臺北市	63000010	松山區	63000010-013	東昌里	1026	2642	1207	1435	113Y06M			
14	63000	臺北市	63000010	松山區	63000010-014	東勢里	1815	4264	1990	2274	113Y06M			
15	63000	臺北市	63000010	松山區	63000010-015	中華里	2564	6595	3047	3548	113Y06M			
16	63000	臺北市	63000010	松山區	63000010-016	民有里	3545	8631	3945	4686	113Y06M			
17	63000	臺北市	63000010	松山區	63000010-017	民福里	2546	5864	2724	3140	113Y06M			
18	63000	臺北市	63000010	松山區	63000010-018	慈祐里	4354	7948	3847	4101	113Y06M			
19	63000	臺北市	63000010	松山區	63000010-019	安平里	3636	7806	3664	4142	113Y06M			
20	63000	臺北市	63000010	松山區	63000010-020	鵬程里	1986	4586	2139	2447	113Y06M			
21	63000	臺北市	63000010	松山區	63000010-021	自強里	3645	8851	4070	4781	113Y06M			
22	63000	臺北市	63000010	松山區	63000010-022	吉祥里	3358	7694	3578	4116	113Y06M			
23	63000	臺北市	63000010	松山區	63000010-024	新聚里	3305	7486	3443	4043	113Y06M			
24	63000	臺北市	63000010	松山區	63000010-025	復盛里	2497	5959	2791	3168	113Y06M			
25	63000	臺北市	63000010	松山區	63000010-026	中正里	3923	10265	4762	5503	113Y06M			
26	63000	臺北市	63000010	松山區	63000010-027	中崙里	1747	4408	2059	2349	113Y06M			
27	63000	臺北市	63000010	松山區	63000010-028	美仁里	1350	3578	1673	1905	113Y06M			
28	63000	臺北市	63000010	松山區	63000010-029	吉仁里	1571	4028	1906	2122	113Y06M			
29	63000	臺北市	63000010	松山區	63000010-030	敦化里	2570	6930	3320	3610	113Y06M			
30	63000	臺北市	63000010	松山區	63000010-031	復源里	1355	3594	1703	1891	113Y06M			
31	63000	臺北市	63000010	松山區	63000010-032	復建里	1877	4636	2196	2440	113Y06M			
32	63000	臺北市	63000010	松山區	63000010-033	復勢里	2659	6392	2922	3470	113Y06M			
33	63000	臺北市	63000010	松山區	63000010-034	福成里	1020	2668	1219	1449	113Y06M			
34	63000	臺北市	63000010	松山區	63000010-035	松基里	1502	3506	1594	1912	113Y06M			
35	63000	臺北市	63000020	信義區	63000020-001	西村甲	1827	4318	1976	2342	113Y06M			

Find all “dash” and replace by blank “”.



Excel :: Data Preprocessing for Population Data

The image displays two side-by-side Microsoft Excel spreadsheets, both titled "113年6月行政區人口統計_村里_臺北市.csv - Excel".

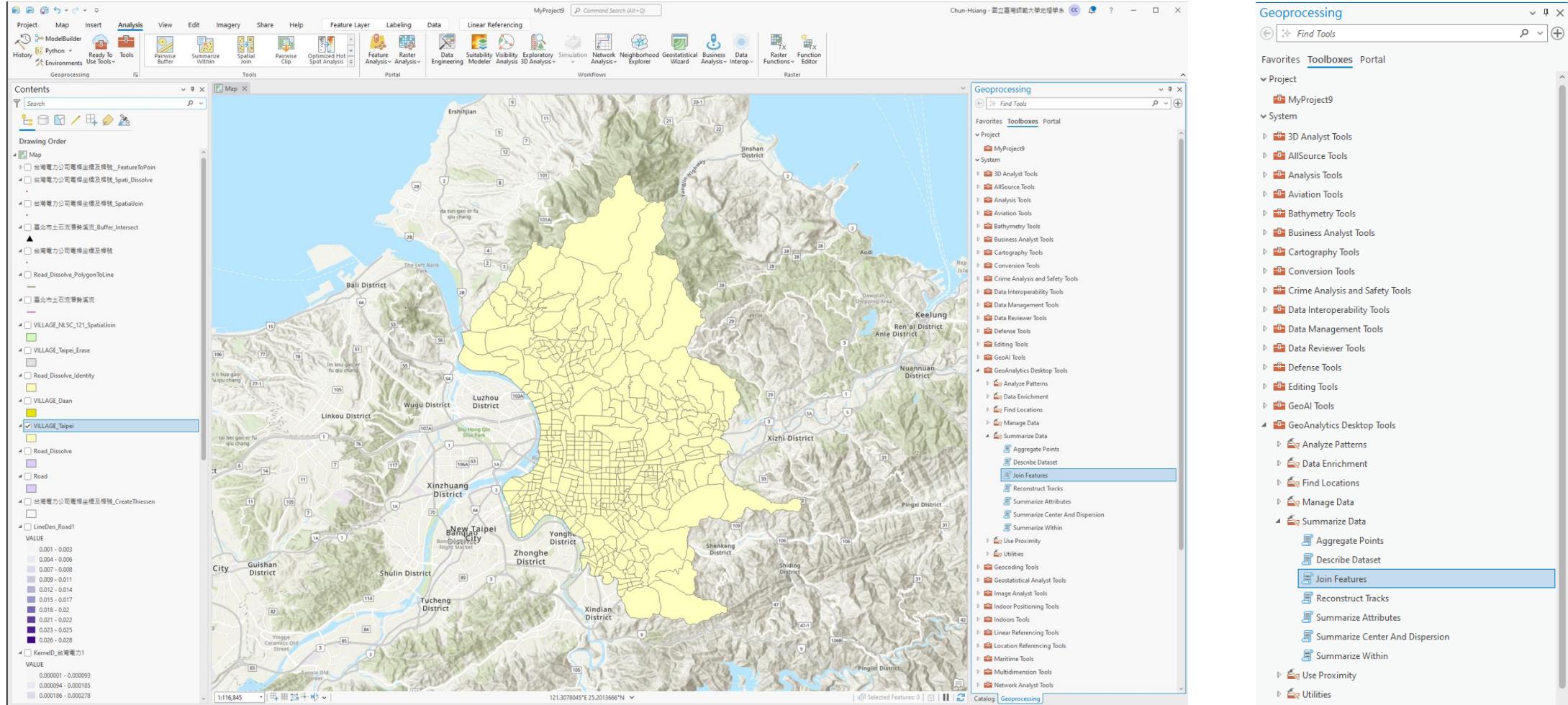
Left Window (Raw Data):

- Contains columns: COUNTY_ID, COUNTY, TOWN_ID, TOWN, V_ID, VILLAGE, H_CNT, P_CNT, M_CNT, F_CNT, INFO_TIME.
- Rows 1-35 show data for various villages like 莊敬里, 東榮里, 三民里, etc., across different towns and districts.
- Row 12 shows a context menu for cell E11, with options like 全部取代(A), 取代(B), 全部尋找(F), and 找下一項(N).

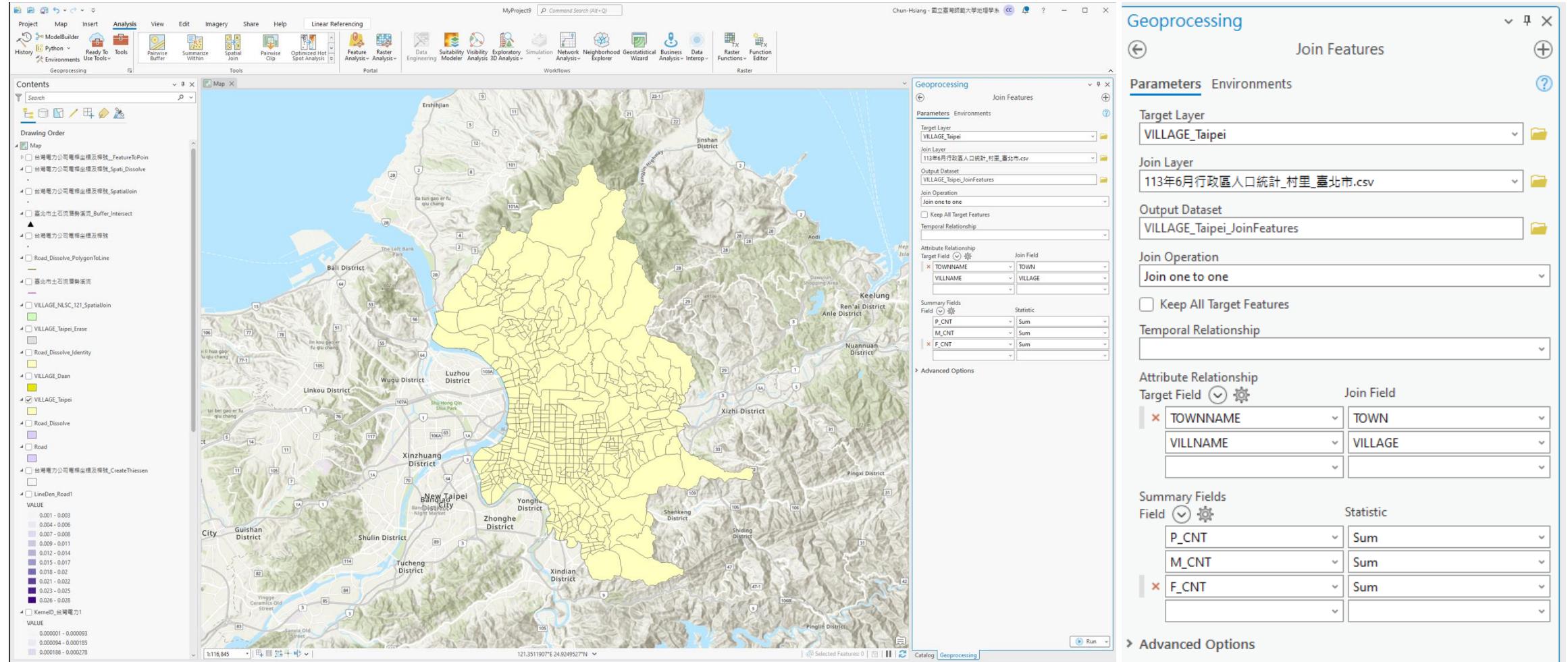
Right Window (Cleaned Data):

- Shows the same structure but with fewer rows, indicating data cleaning has been performed.
- Rows 1-35 show simplified data, such as 莊敬里, 3073, 8035, 3718, 4317, 113Y06M.
- Column headers are explicitly labeled: COUNTY_ID, COUNTY, TOWN_ID, TOWN, V_ID, VILLAGE, H_CNT, P_CNT, M_CNT, F_CNT, INFO_TIME.

GeoAnalytics Desktop Tools/Join Features from POP Data to Taipei Village Layer



GeoAnalytics Desktop Tools/Join Features from POP Data to Taipei Village Layer

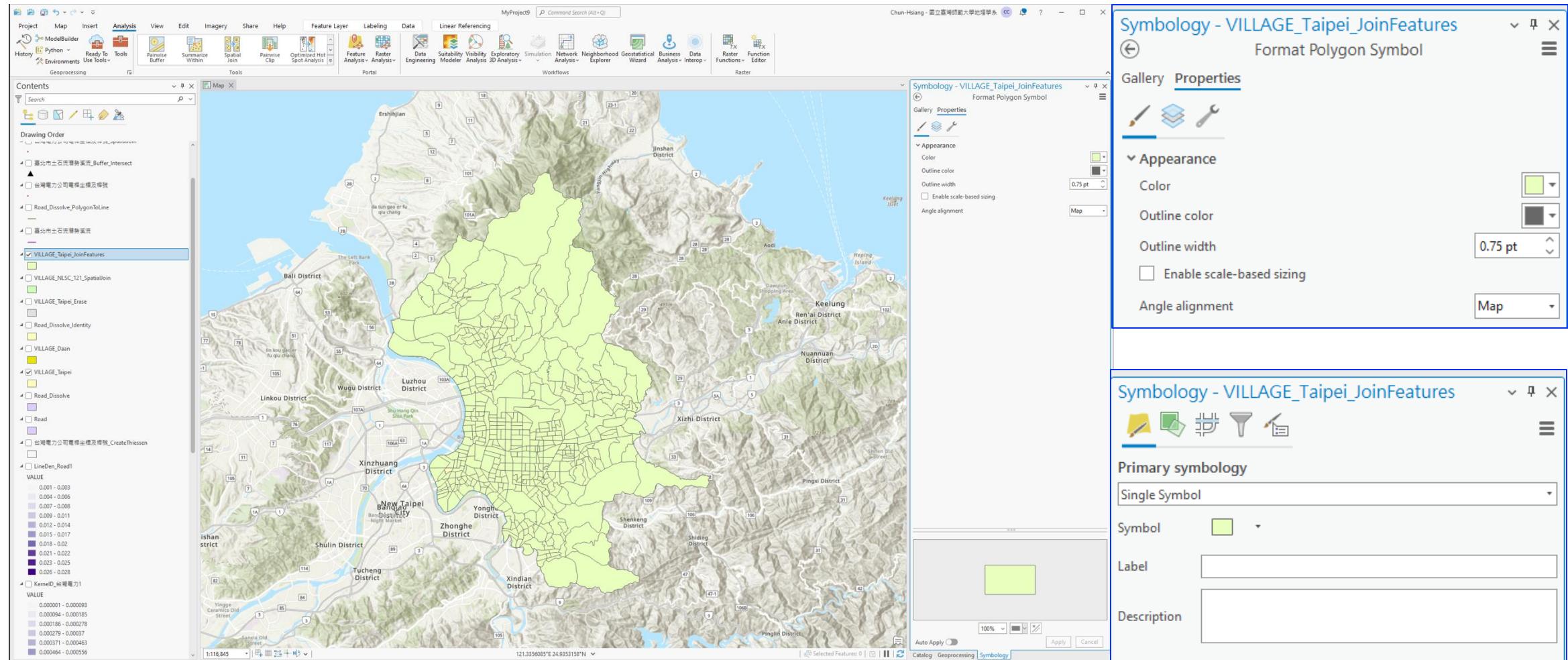


GeoAnalytics Desktop Tools/Join Features from POP Data to Taipei Village Layer

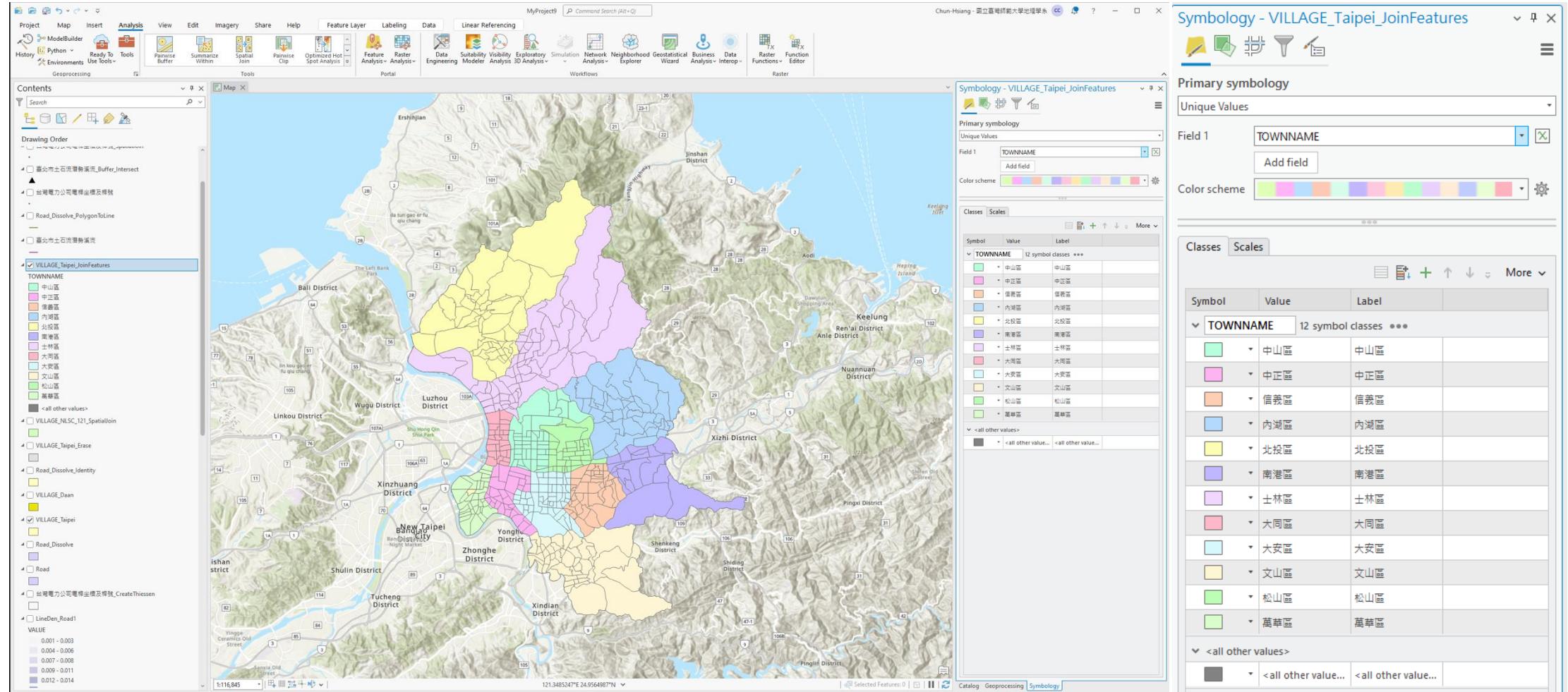
The screenshot shows the GeoAnalytics Desktop interface with a map of Taipei's village layers. A table titled "VILLAGE_Taipei_JoinFeatures" is displayed below the map, showing joined population data. To the right, a detailed view of the "Join Features" dialog is shown, illustrating the process of joining population data to the village layer.

YNAME	TOWNNAME	VILLNAME	VILLENG	COUNTYID	COUNTYCODE	TOWNID	TOWNCODE	NOTE	COUNT	SUM_P_CNT	SUM_M_CNT	SUM_F_CNT	SF
1	松山區	東光里	Dongguang Vill.	A	63000	A01	63000010		1	6607	3076	3531	Pc
2	大同區	迪義里	Jiantai Vill.	A	63000	A09	63000060		1	3640	1729	1911	Pc
3	中山區	正芳里	Zhengyi Vill.	A	63000	A10	63000040		1	5152	2198	2954	Pc
4	中山區	正福里	Zhengfu Vill.	A	63000	A10	63000040		1	3695	1603	2092	Pc
5	文山區	崇善里	Jingdong Vill.	A	63000	A11	63000060		1	7237	3344	3893	Pc
6	萬華區	重慶里	Zhongqing Vill.	A	63000	A13	63000090		1	6175	2927	3248	Pc
7	中正區	興亞里	Xingya Vill.	A	63000	A10	63000040		1	5452	2458	2994	Pc
8	內湖區	石溝里	Shitai Vill.	A	63000	A14	63000100		1	4134	1943	2191	Pc
9	內湖區	湖光里	Huayuan Vill.	A	63000	A14	63000100		1	6551	3109	3442	Pc
10	松山區	翠芳里	Ciyou Vill.	A	63000	A01	63000010		1	7948	3847	4101	Pc
11	大同區	捷功里	Jiagong Vill.	A	63000	A09	63000060		1	4640	2194	2446	Pc
12	文山區	政大里	Zhengda Vill.	A	63000	A11	63000060		1	7999	3841	4158	Pc
13	內湖區	益州里	Luzhou Vill.	A	63000	A14	63000100		1	1264	667	597	Pc
14	萬華區	吉新里	Xinxi Vill.	A	63000	A13	63000090		1	4487	2167	2320	Pc
15	文山區	崇善里	Jingding Vill.	A	63000	A11	63000060		1	6443	3017	3426	Pc
16	中山區	朱園里	Zhuoyuan Vill.	A	63000	A10	63000040		1	4469	2010	2459	Pc
17	文山區	興華里	Xinghua Vill.	A	63000	A11	63000060		1	7191	3450	3741	Pc
18	大同區	保安里	Bao'an Vill.	A	63000	A09	63000060		1	4336	2051	2285	Pc
19	文山區	崇仁里	Jingren Vill.	A	63000	A11	63000060		1	6049	2813	3236	Pc
20	文山區	木柵里	Muzha Vill.	A	63000	A11	63000060		1	9599	4474	5125	Pc

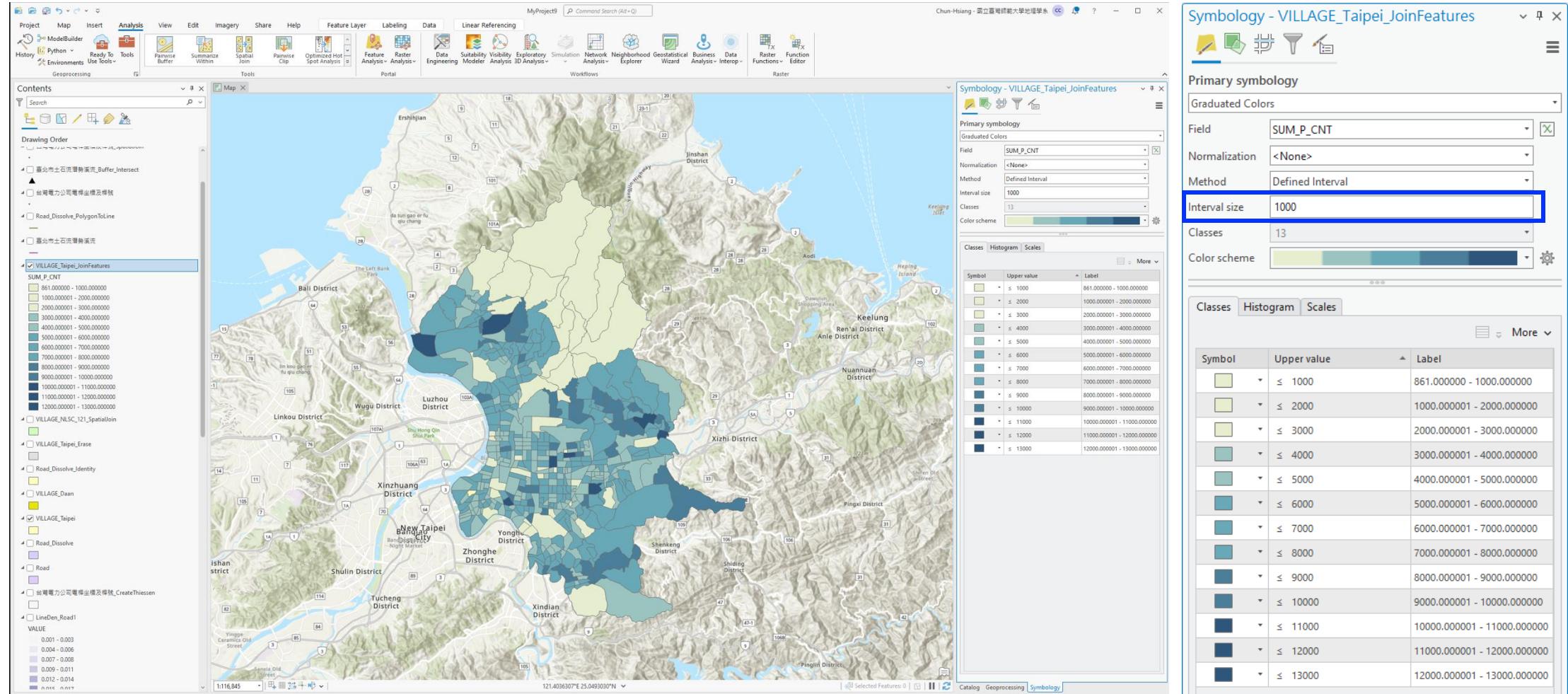
Symbology :: Single Symbol



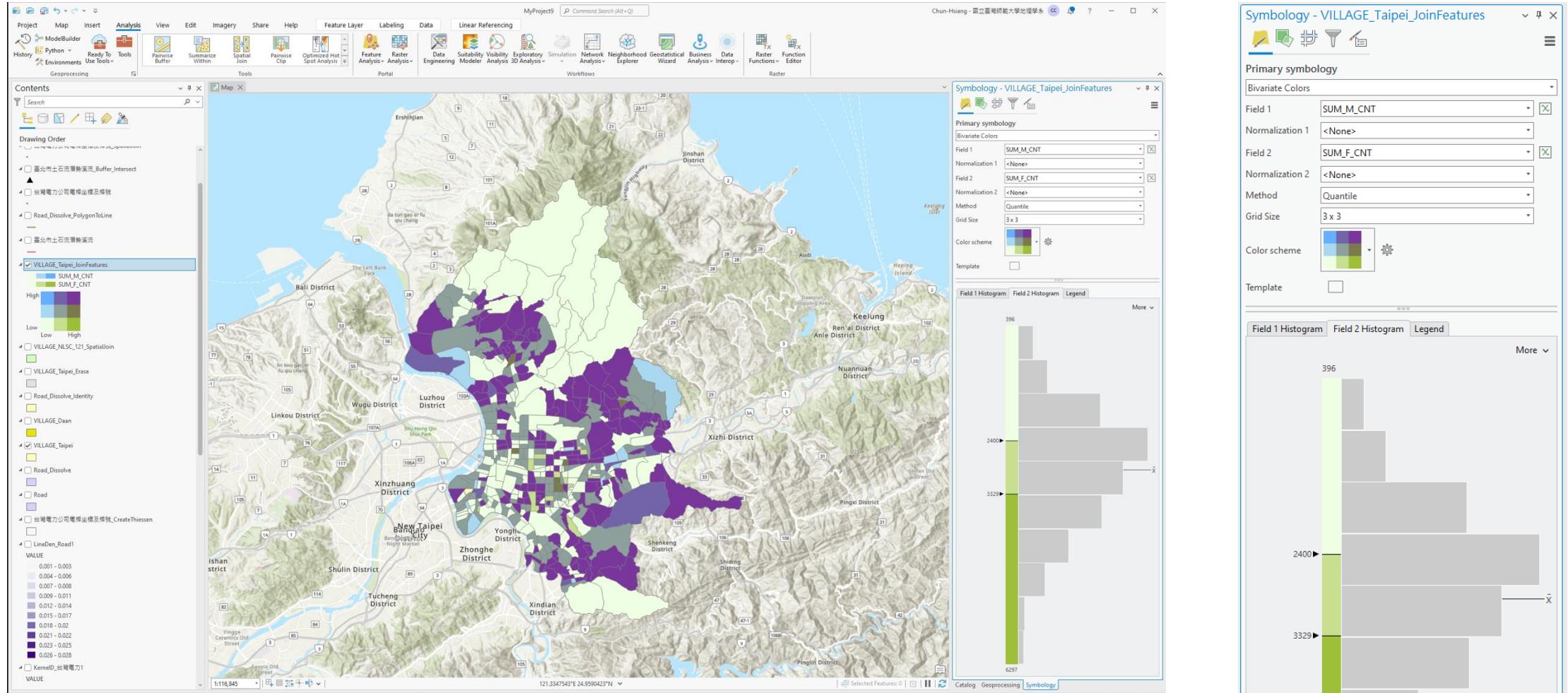
Symbology :: Unique Values with District



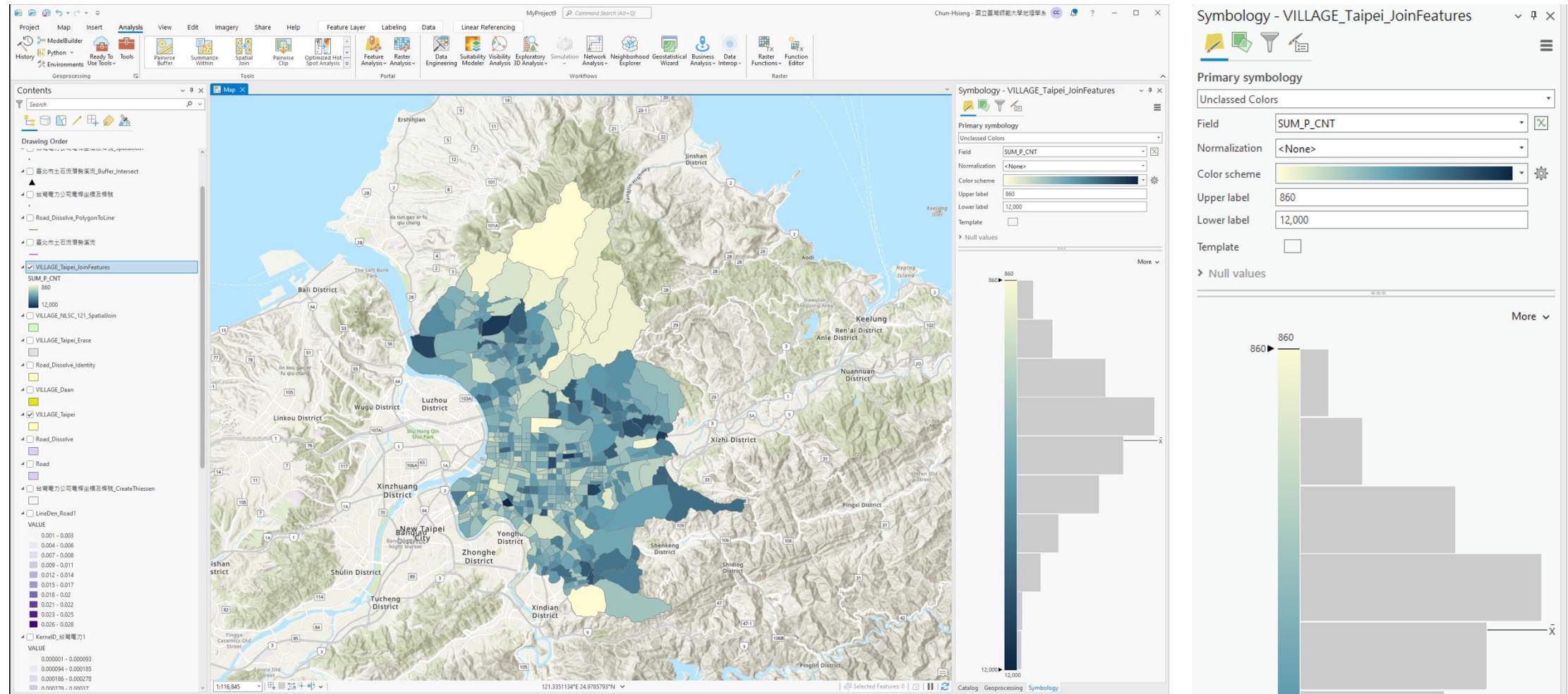
Symbology :: Graduated Colors with P_CNT



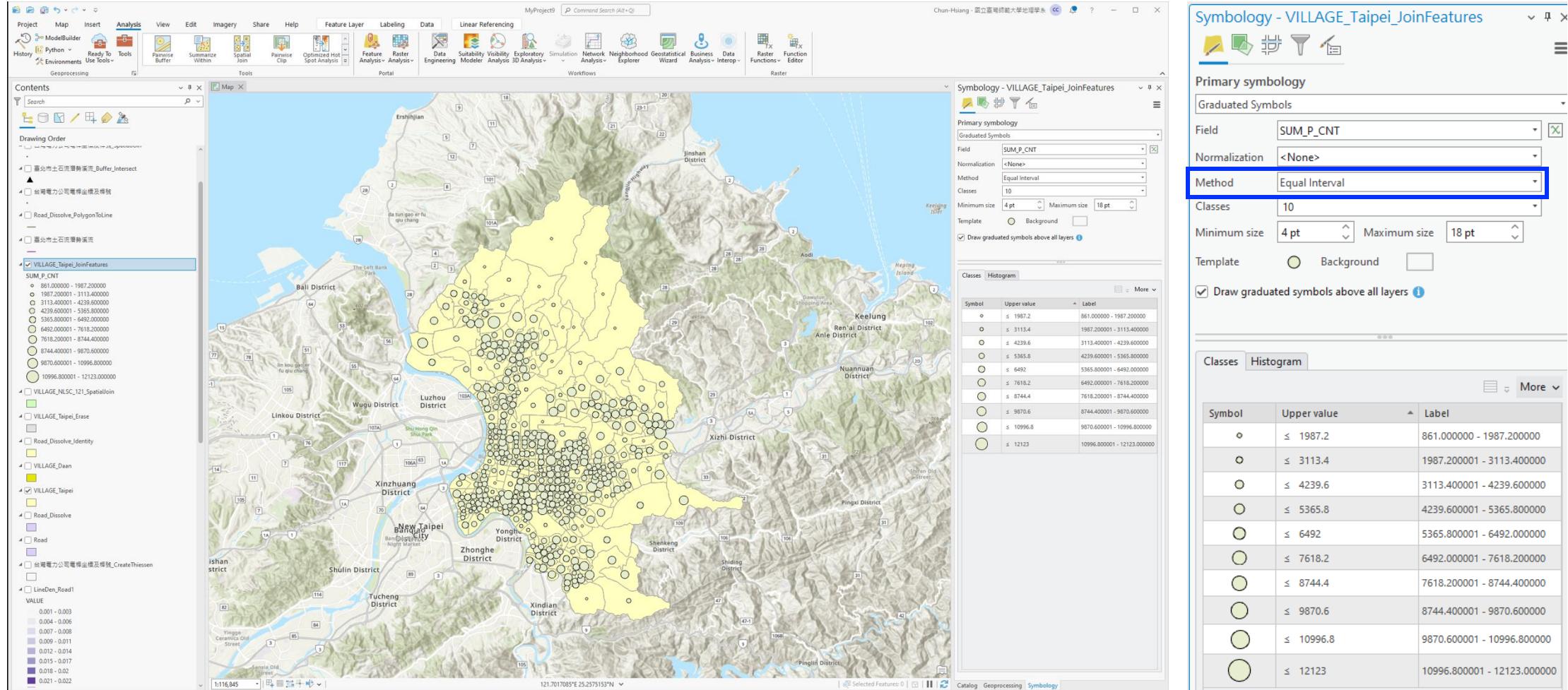
Symbology :: Bivariate Colors with P_CNT



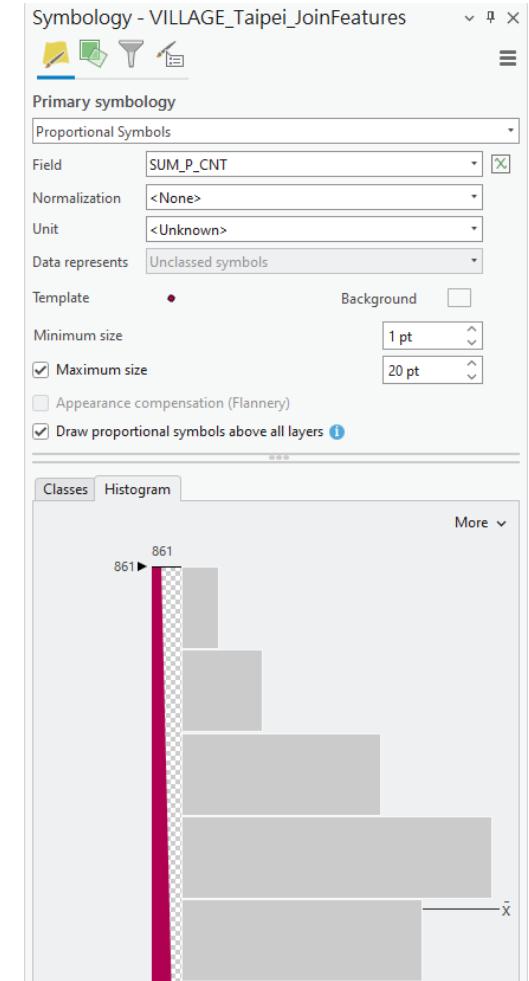
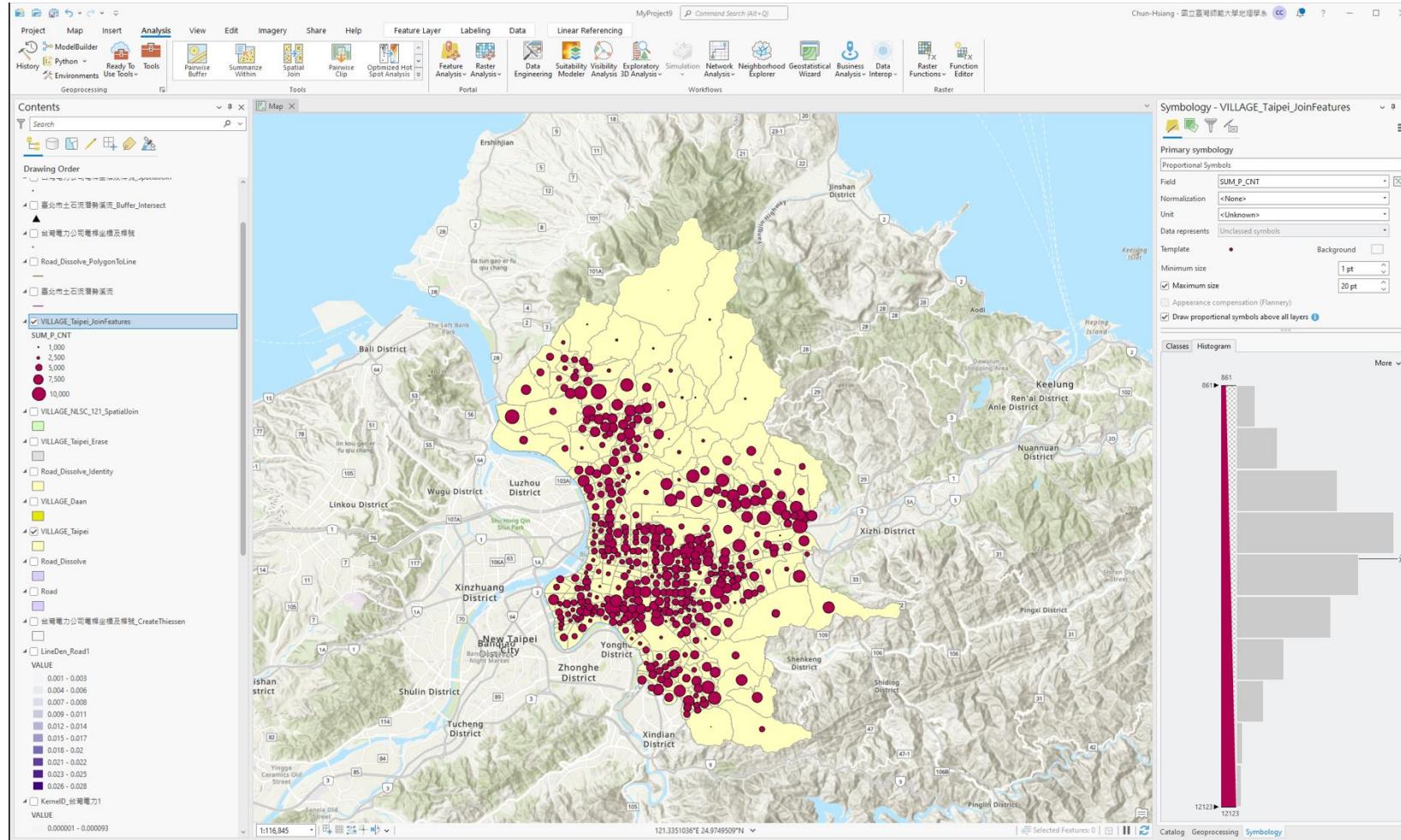
Symbology :: Unclassed Colors with P_CNT



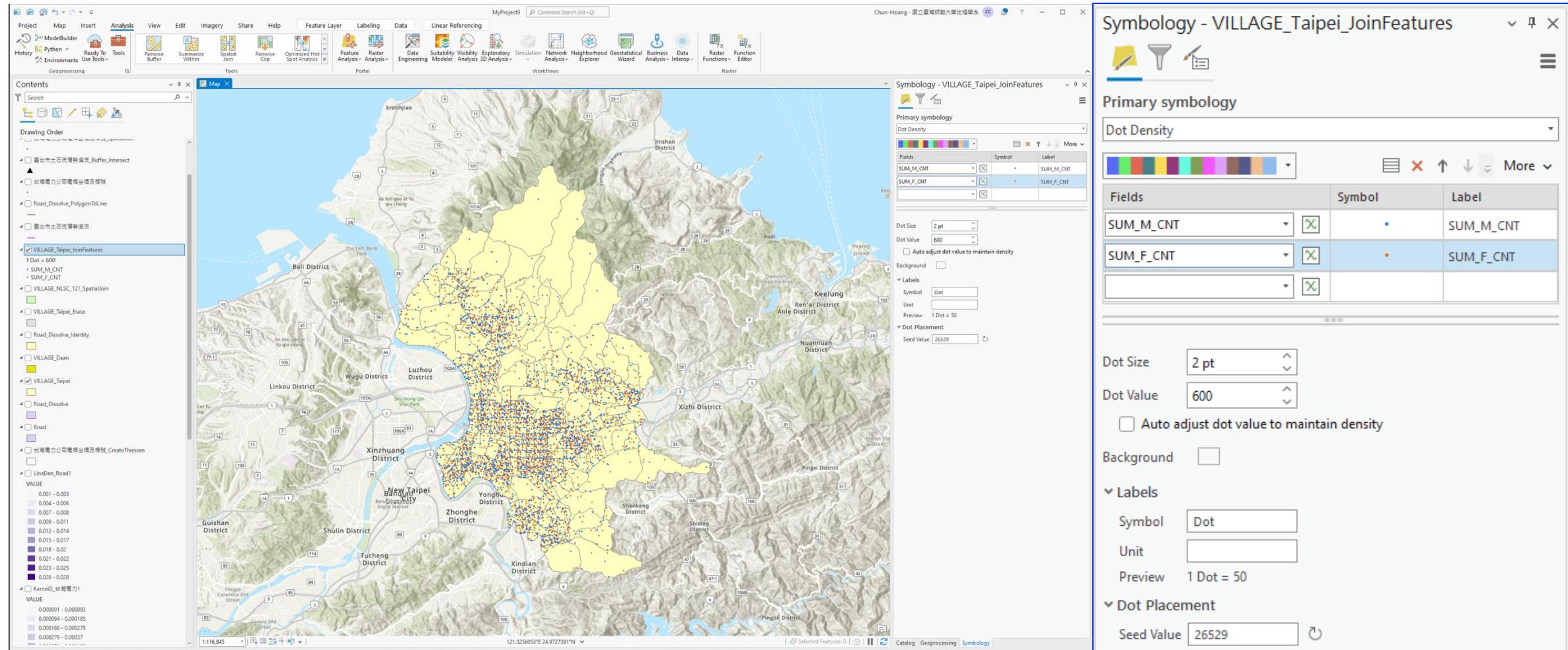
Symbology :: Graduated Symbols for Polygon with P_CNT



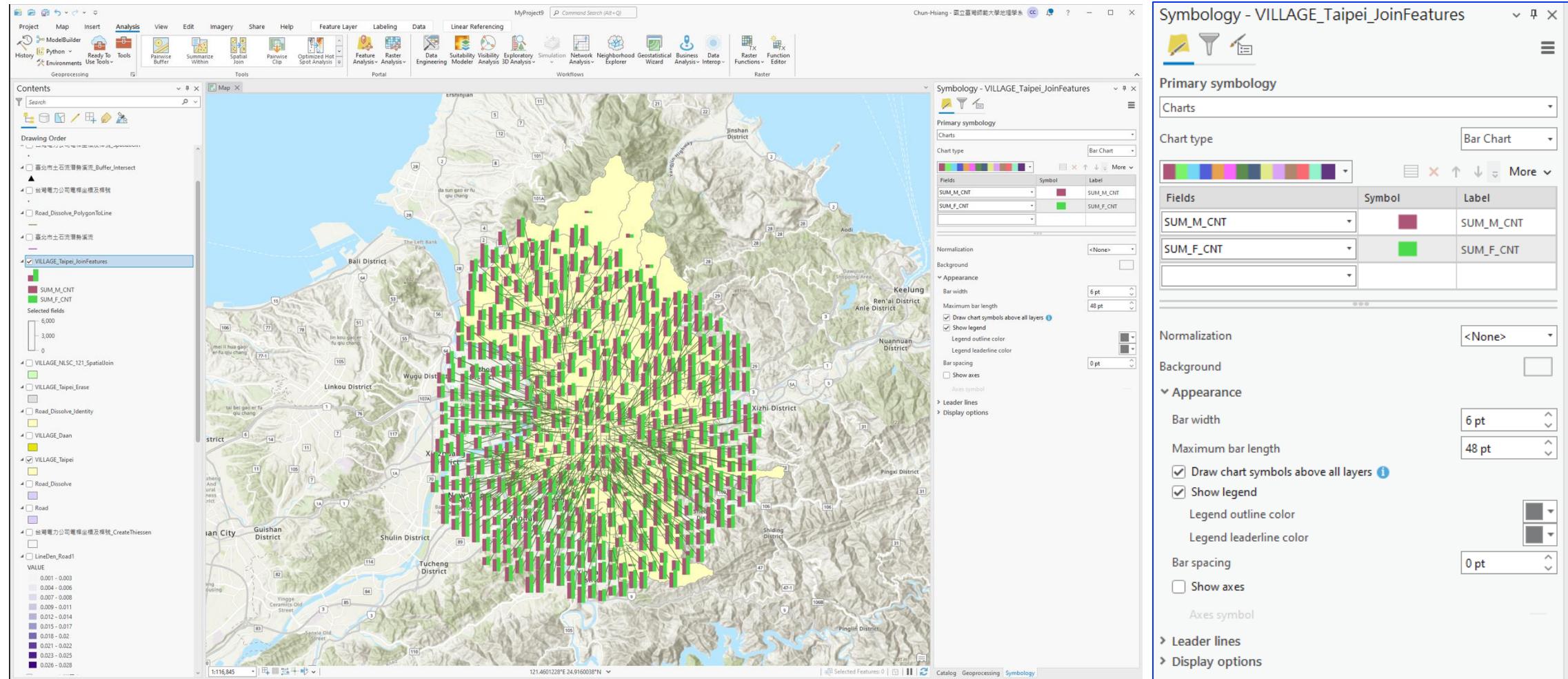
Symbology :: Proportional Symbols for Polygon with P_CNT



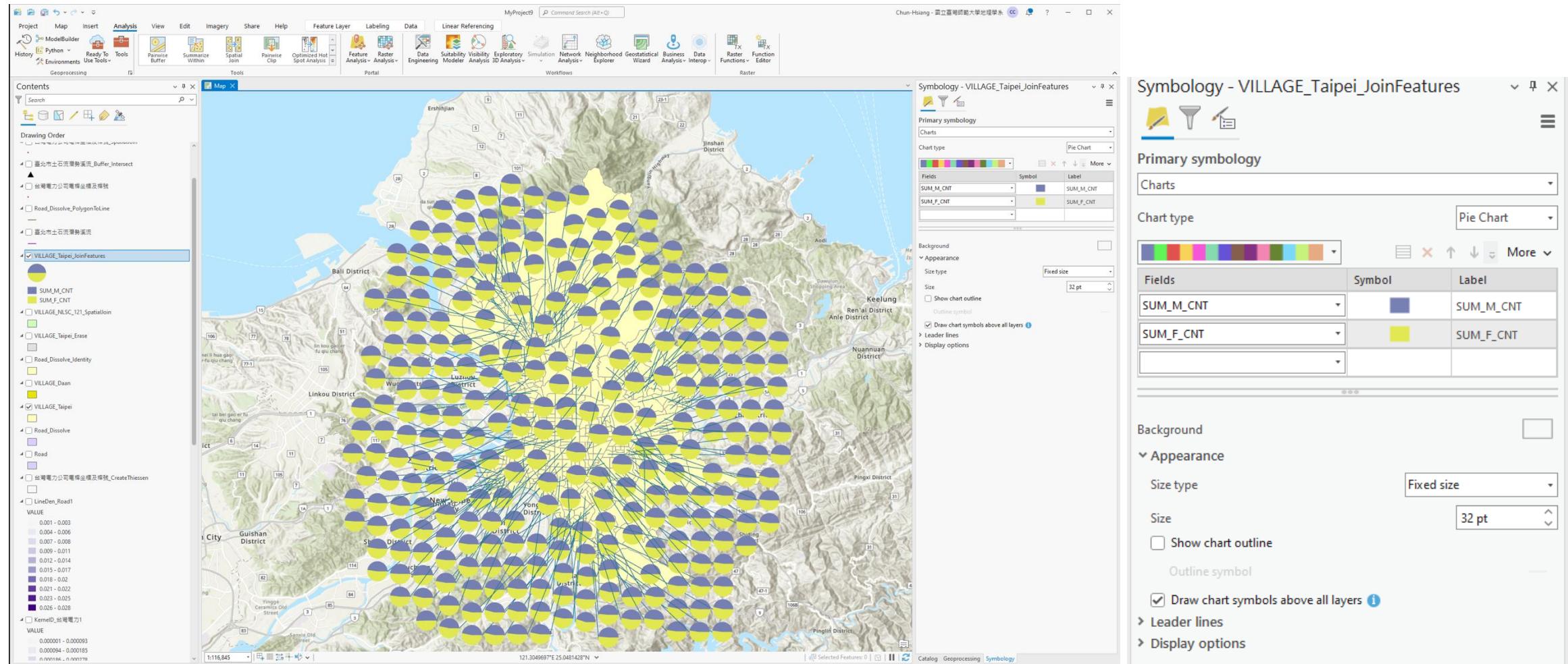
Symbology :: Dot Density for Polygon (M/F)



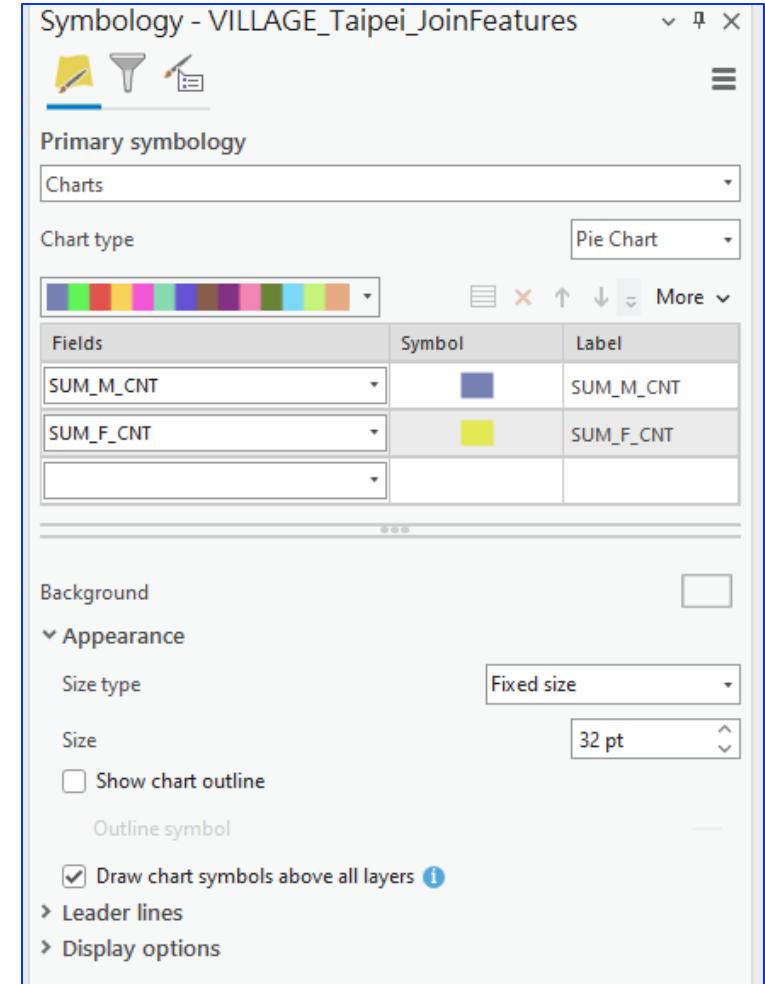
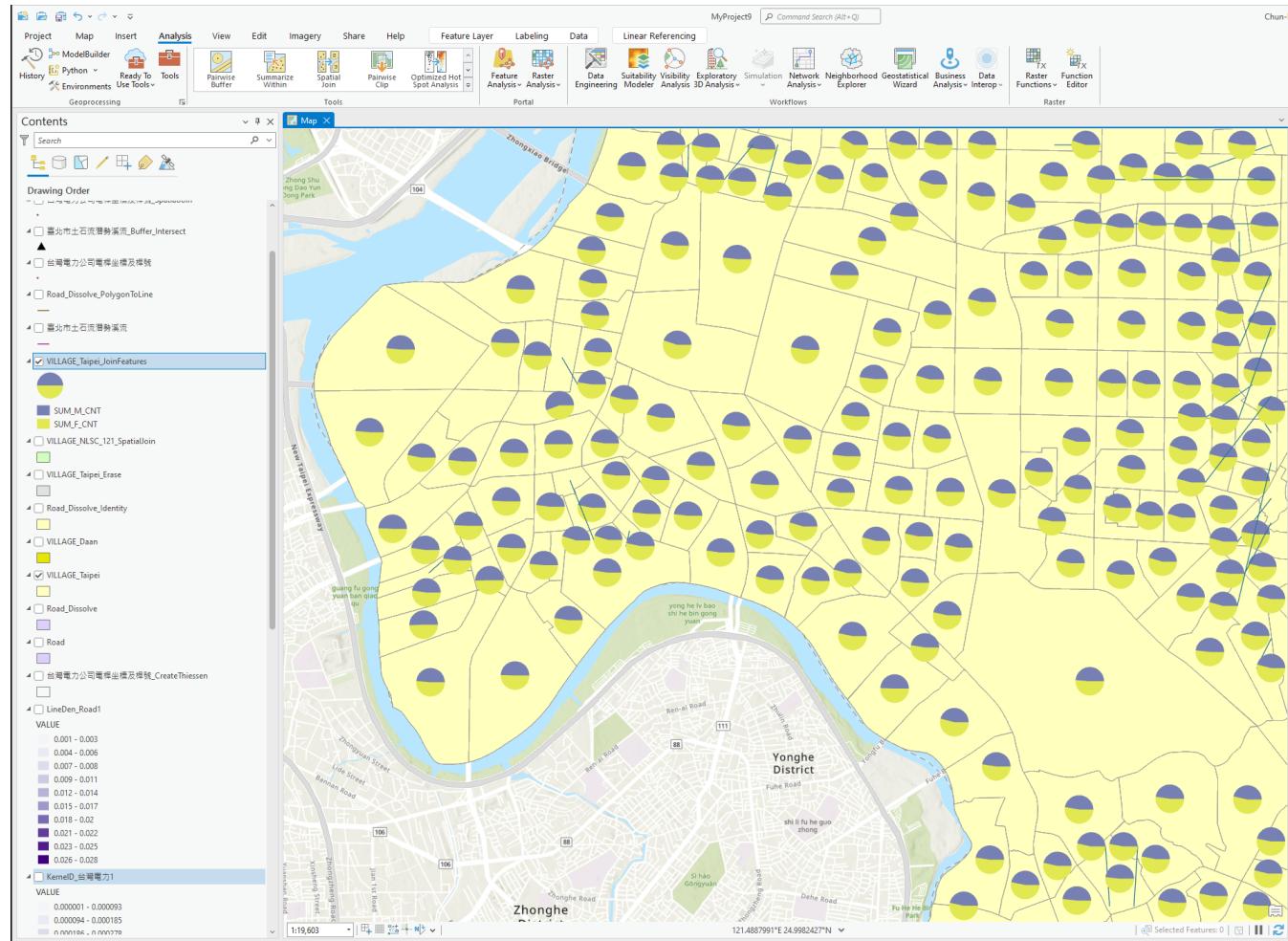
Symbology :: Bar Chart for Polygon (M/F)



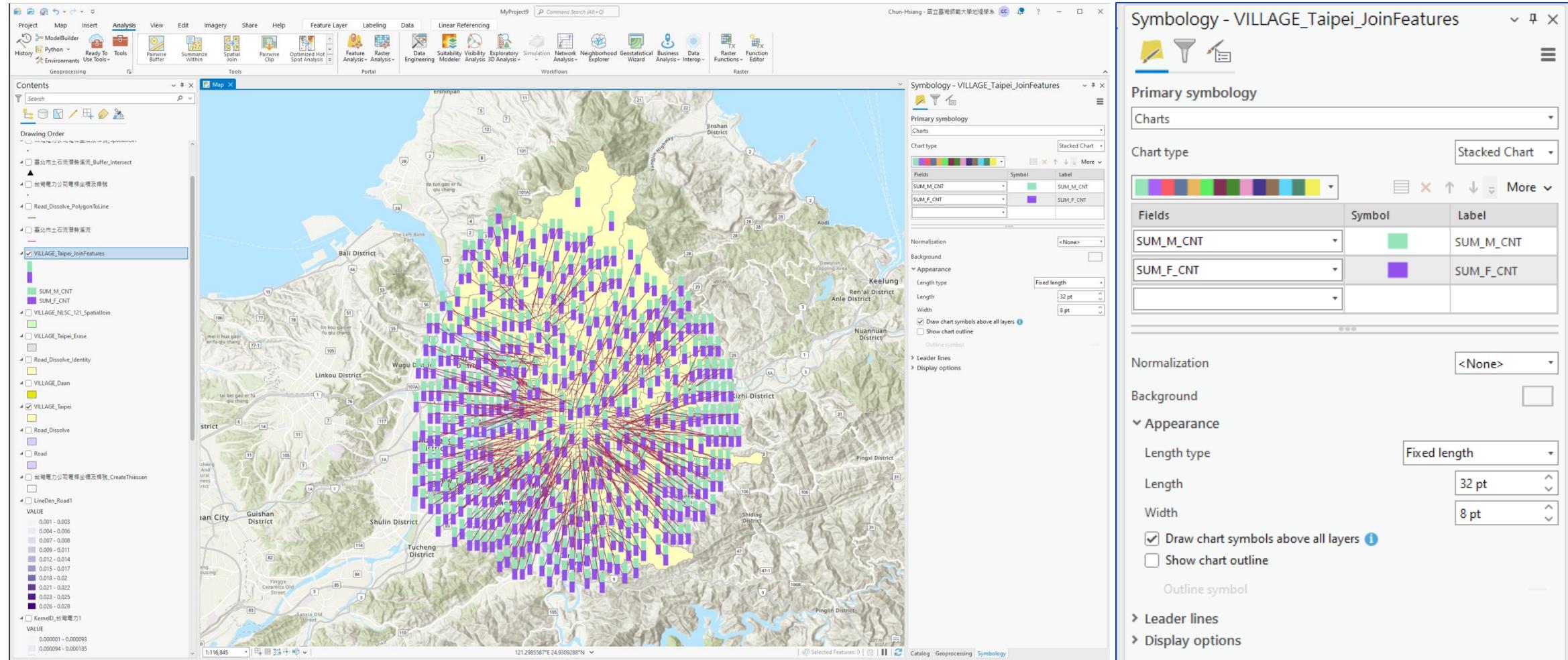
Symbology :: Pie Chart for Polygon (M/F)



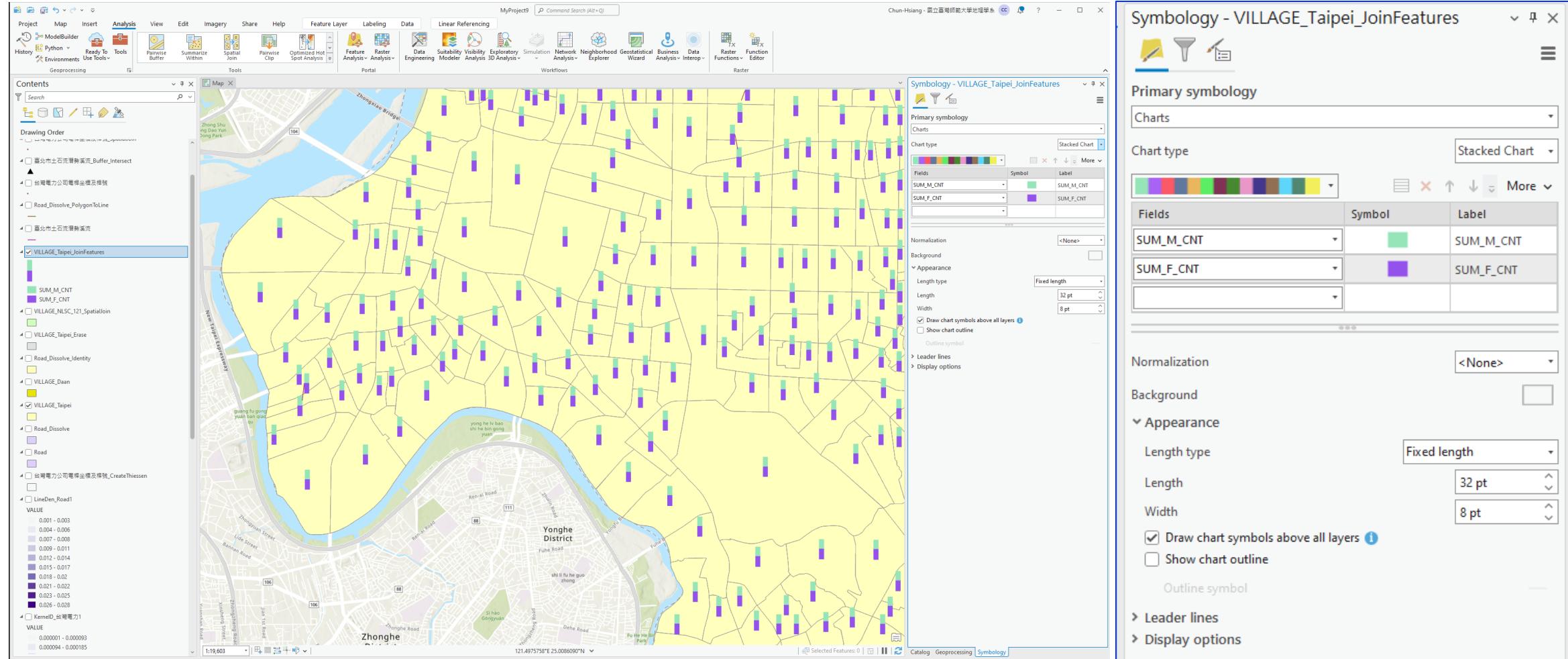
Symbology :: Pie Chart for Polygon (M/F)



Symbology :: Stacked Chart for Polygon (M/F)



Symbology :: Stacked Chart for Polygon (M/F)



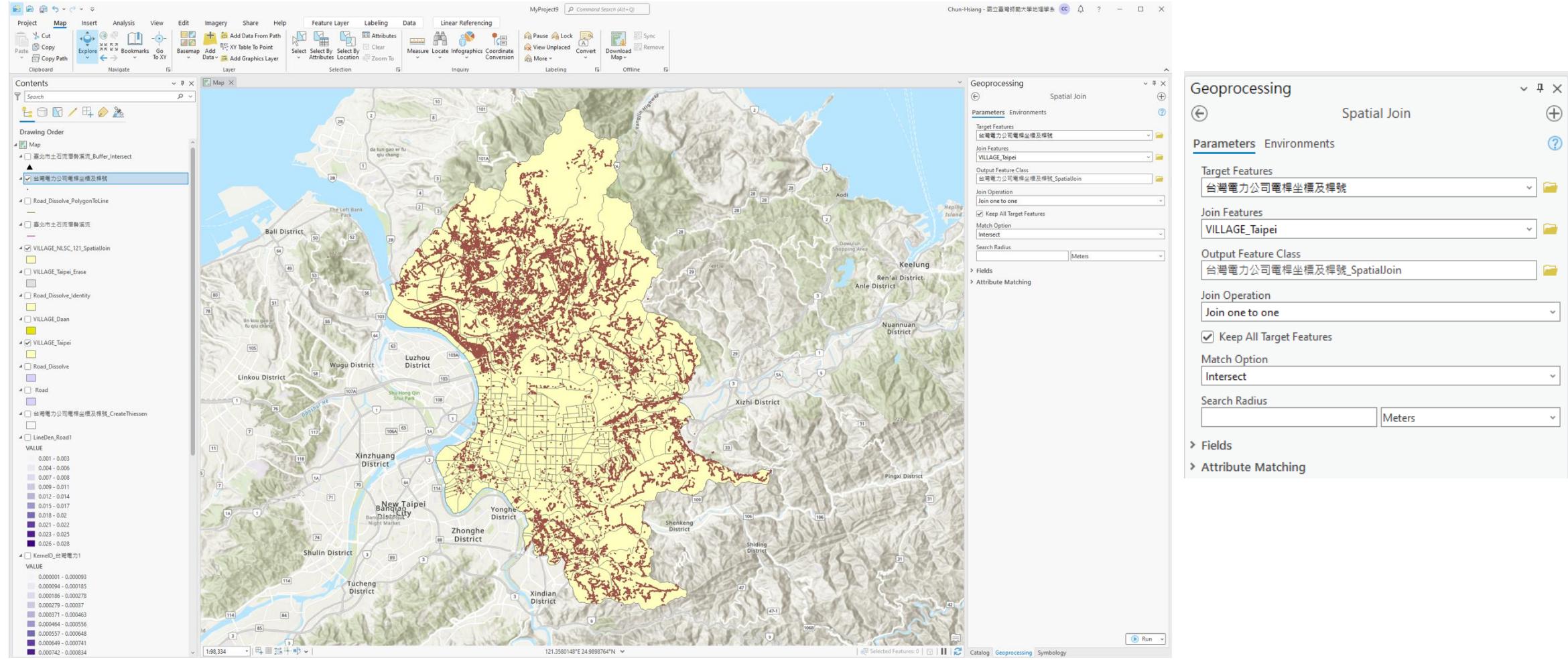
Symbology :: Point

Feature to Point/ Single Symbol/ Unique Values/ Graduated Colors/ Bivariate Colors/ Unclassed Colors/ Proportional Symbols/ Graduated Symbols/ Dot Density

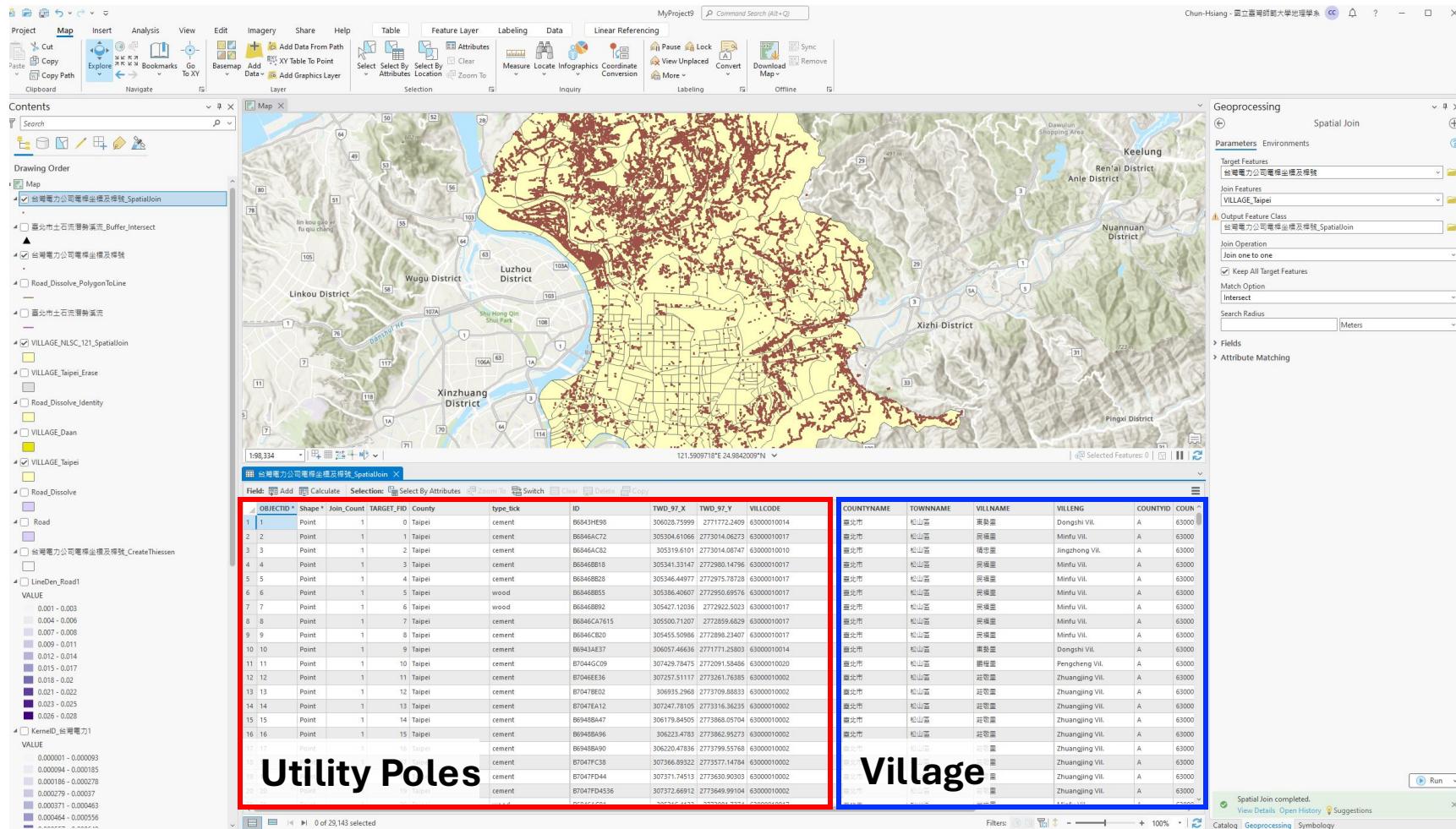
Procedure for Aggregated Features

- 1) **Spatial Join** for Adding Village into Each Ups
- 2) **Spatial Join** for Counting UPs of Each Village
- 3) **Dissolve** the Spatial Joined UP Layer into Village Resolution
- 4) **Feature To Point** for Converting Dissolved and Spatial Joined UP Layer to Single Point
- 5) **Symbolology :: Single Symbols** :: Types of Symbols
- 6) **Symbolology :: Single Symbols** :: Symbols and Properties
- 7) **Symbolology :: Single Symbol**
- 8) **Symbolology :: Unique Values** by District
- 9) **Symbolology :: Graduated Colors** by UP_CNT
- 10) **Symbolology :: Unclassed Colors** with UP_CNT
- 11) **Symbolology :: Proportional Symbols** with UP_CNT
- 12) **Symbolology :: Dot Density** with UP_CNT

Spatial Join for Adding Village into Each Ups



Spatial Join for Counting UPs of Each Village



Dissolve the Spatial Joined UP Layer into Village Resolution

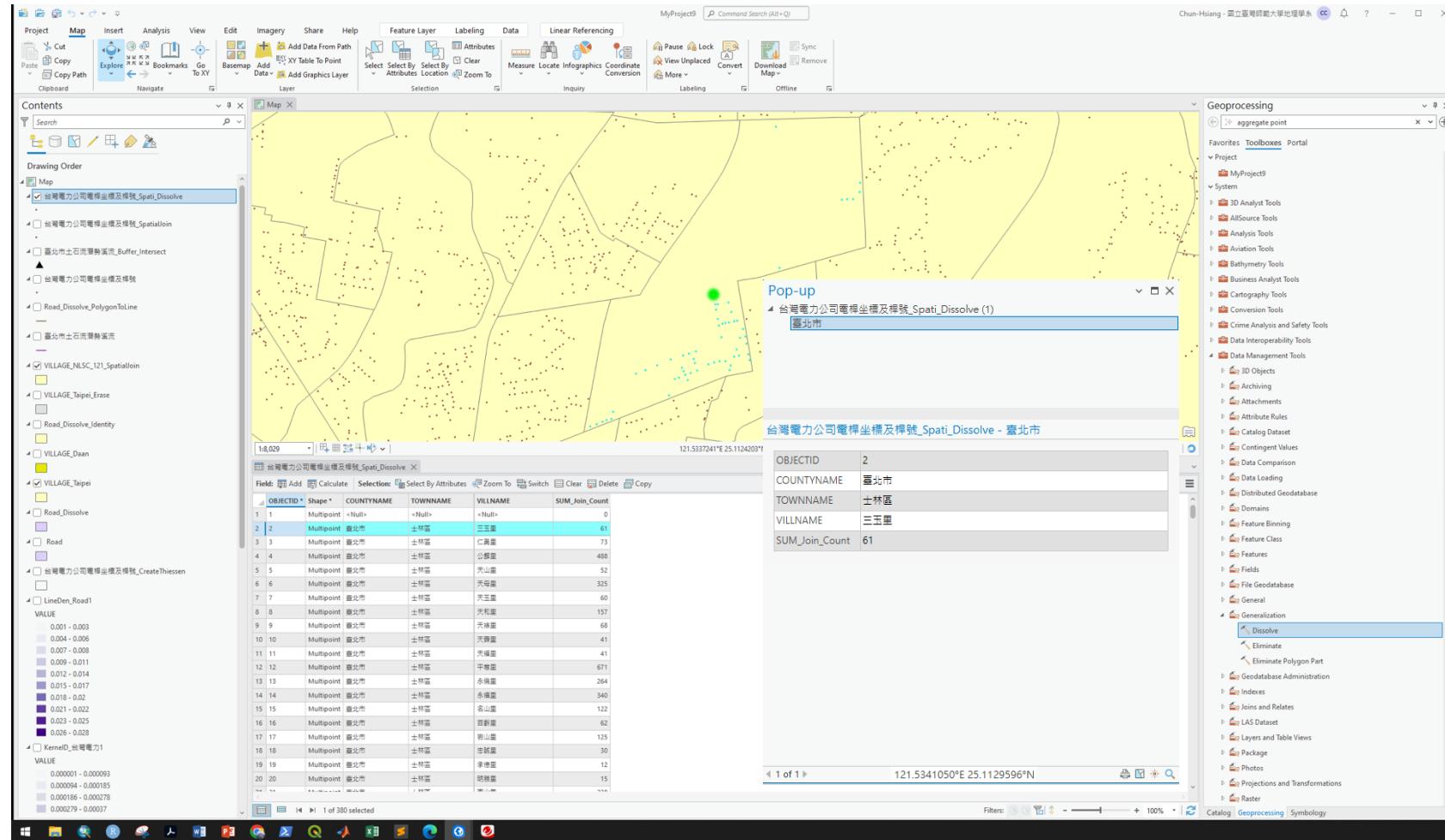
The screenshot illustrates the process of dissolving a spatially joined layer into village resolution using ArcGIS Pro.

Map View: The main map shows the Taipei metropolitan area with various districts (Linkou, Wugu, Luxhou, Xizhi, Pingxi, Anle, Renai, and Nuannuan) and a shopping area in Keelung. A legend on the left indicates several layers, including "台灣電力公司電桿坐標及桿號_SpatialJoin" (highlighted in red).

Data Catalog: The bottom-left pane displays a table of joined data. The columns include OBJECTID, Shape, Join_Count, TARGET_FID, County, type_tick, ID, TWD_97_X, TWD_97_Y, VILLCODE, COUNTYNAME, TOWNNAME, VILLNAME, VILLENG, COUNTYID, COUN, and VALUE. The table lists numerous points across different districts, categorized by their Join_Count (e.g., 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20).

Geoprocessing Panel: The right panel shows the "Dissolve" tool configuration. The "Input Features" field is set to "台灣電力公司電桿坐標及桿號_SpatialJoin". The "Output Feature Class" field is set to "台灣電力公司電桿坐標及桿號_Spati_Dissolve". Under "Dissolve Fields", the "VILLNAME" field is selected. In the "Statistics Fields" section, the "Join_Count" field is selected with a "Sum" statistic type. The "Create multipart features" checkbox is checked, while "Unsplit lines" is unchecked.

Dissolve the Spatial Joined UP Layer into Village Resolution



Every row is Multipoint!!!

So, our target is to merge all points within the same village into a single point.

The screenshot shows the attribute table for the dissolved layer. It contains one row for each village, where multiple points have been merged into a single multipoint feature.

OBJECTID	Shape*	COUNTYNAME	TOWNNAME	VILLNAME	SUM_Join_Count
1	Multipoint	<Null>	<Null>	<Null>	0
2	Multipoint	臺北市	士林區	三玉里	61
3	Multipoint	臺北市	士林區	仁勇里	73
4	Multipoint	臺北市	士林區	公館里	488
5	Multipoint	臺北市	士林區	天山里	52
6	Multipoint	臺北市	士林區	天玉里	325
7	Multipoint	臺北市	士林區	天玉里	60
8	Multipoint	臺北市	士林區	天和里	157
9	Multipoint	臺北市	士林區	天福里	68
10	Multipoint	臺北市	士林區	天福里	41
11	Multipoint	臺北市	士林區	天福里	41
12	Multipoint	臺北市	士林區	平埔里	671
13	Multipoint	臺北市	士林區	永倫里	264
14	Multipoint	臺北市	士林區	永福里	340
15	Multipoint	臺北市	士林區	名山里	122
16	Multipoint	臺北市	士林區	百齡里	62
17	Multipoint	臺北市	士林區	岩山里	125
18	Multipoint	臺北市	士林區	忠誠里	30
19	Multipoint	臺北市	士林區	孝德里	12
20	Multipoint	臺北市	士林區	明勝里	15

Feature To Point for Converting Dissolved and Spatial Joined UP Layer to Single Point

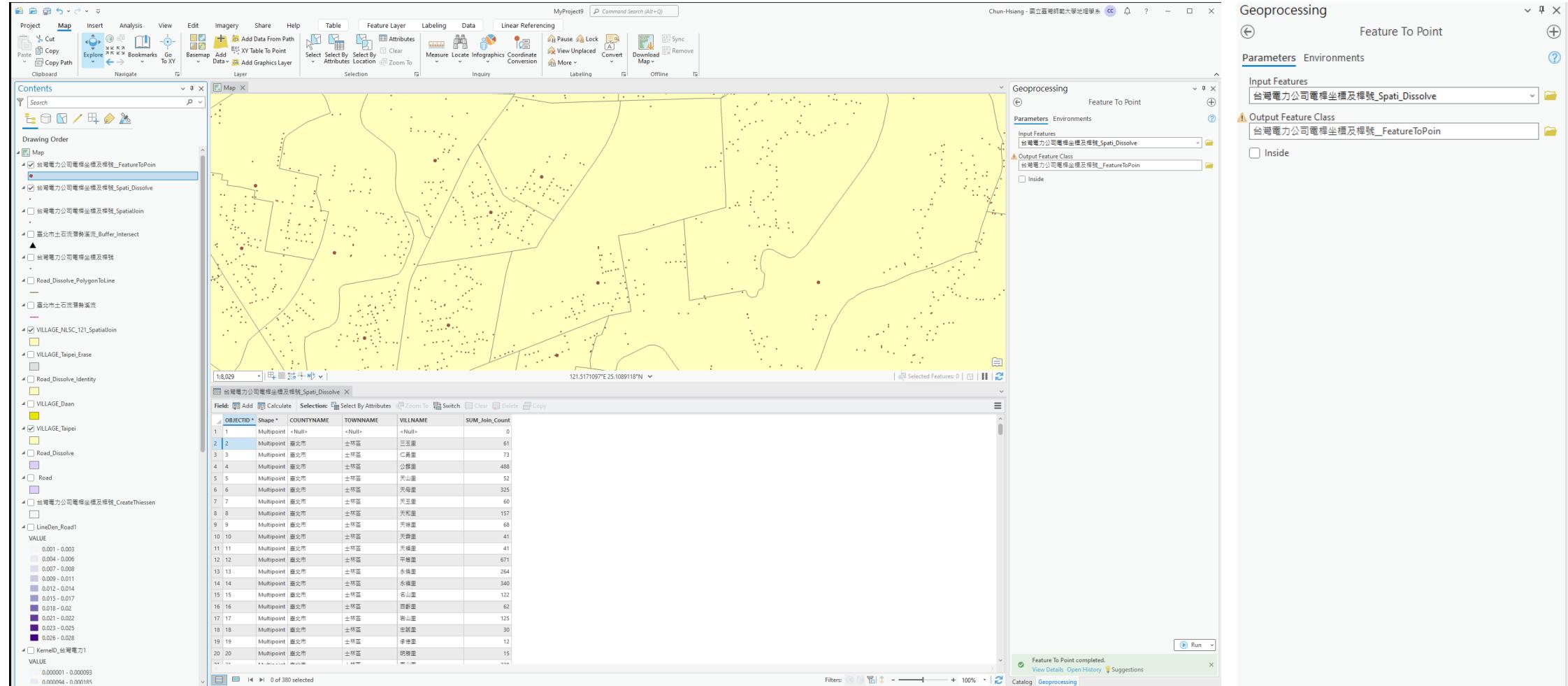
The screenshot shows the ArcGIS Pro interface with the following components:

- Top Bar:** Project, Map, Insert, Analysis, View, Edit, Imagery, Share, Help.
- Toolbars:** Feature Layer, Labeling, Data, Linear Referencing, Selection, Inquiry, Labeling, Offline.
- Contents Panel:** Shows various layers including "台灣電力公司電桿坐標及桿號_Spati_Dissolve", "VILLAGE_Taipei_Erase", "VILLAGE_Daan", "VILLAGE_Taipei", and "VILLAGE_NLSC_121_SpatialJoin".
- Map View:** Displays a map of Taipei with several dissolved and spatial joined layers overlaid, including red and blue point features.
- Table View:** Shows a table titled "Selected Features: 1" with columns: OBJECTID*, Shape*, COUNTRYNAME, TOWNNAME, VILLNAME, and SUM_Join_Count. The data is as follows:

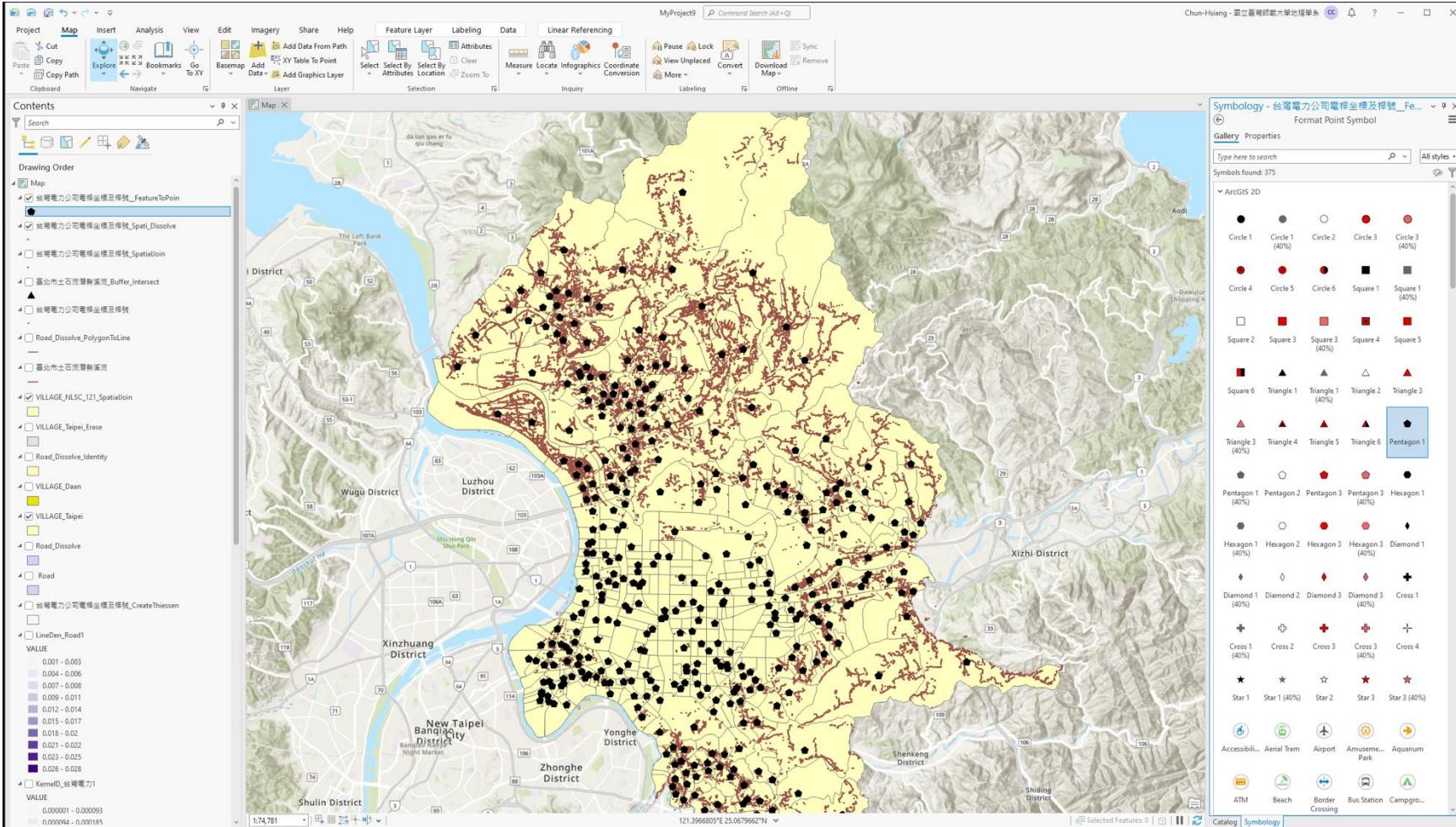
OBJECTID*	Shape*	COUNTRYNAME	TOWNNAME	VILLNAME	SUM_Join_Count
1	Multipoint	<Null>	<Null>		0
2	Multipoint	臺北市	士林區	三三里	61
3	Multipoint	臺北市	士林區	仁勇里	73
4	Multipoint	臺北市	士林區	公館里	488
5	Multipoint	臺北市	士林區	天山里	52
6	Multipoint	臺北市	士林區	天母里	325
7	Multipoint	臺北市	士林區	天王里	60
8	Multipoint	臺北市	士林區	天祐里	157
9	Multipoint	臺北市	士林區	天母里	68
10	Multipoint	臺北市	士林區	天昇里	41
11	Multipoint	臺北市	士林區	天福里	41
12	Multipoint	臺北市	士林區	平等里	671
13	Multipoint	臺北市	士林區	永康里	264
14	Multipoint	臺北市	士林區	永康里	340
15	Multipoint	臺北市	士林區	名山里	122
16	Multipoint	臺北市	士林區	百齡里	62
17	Multipoint	臺北市	士林區	岩山里	125
18	Multipoint	臺北市	士林區	忠誠里	30
19	Multipoint	臺北市	士林區	承德里	12
20	Multipoint	臺北市	士林區	明德里	15

- Geoprocessing Panel:** Shows the "feature to point" tool under the "Features" category.
- Geoprocessing Tool Dialog:** Set to "Feature To Point" with "Input Features" set to "台灣電力公司電桿坐標及桿號_Spati_Dissolve" and "Output Feature Class" set to "台灣電力公司電桿坐標及桿號_FeatureToPoint".

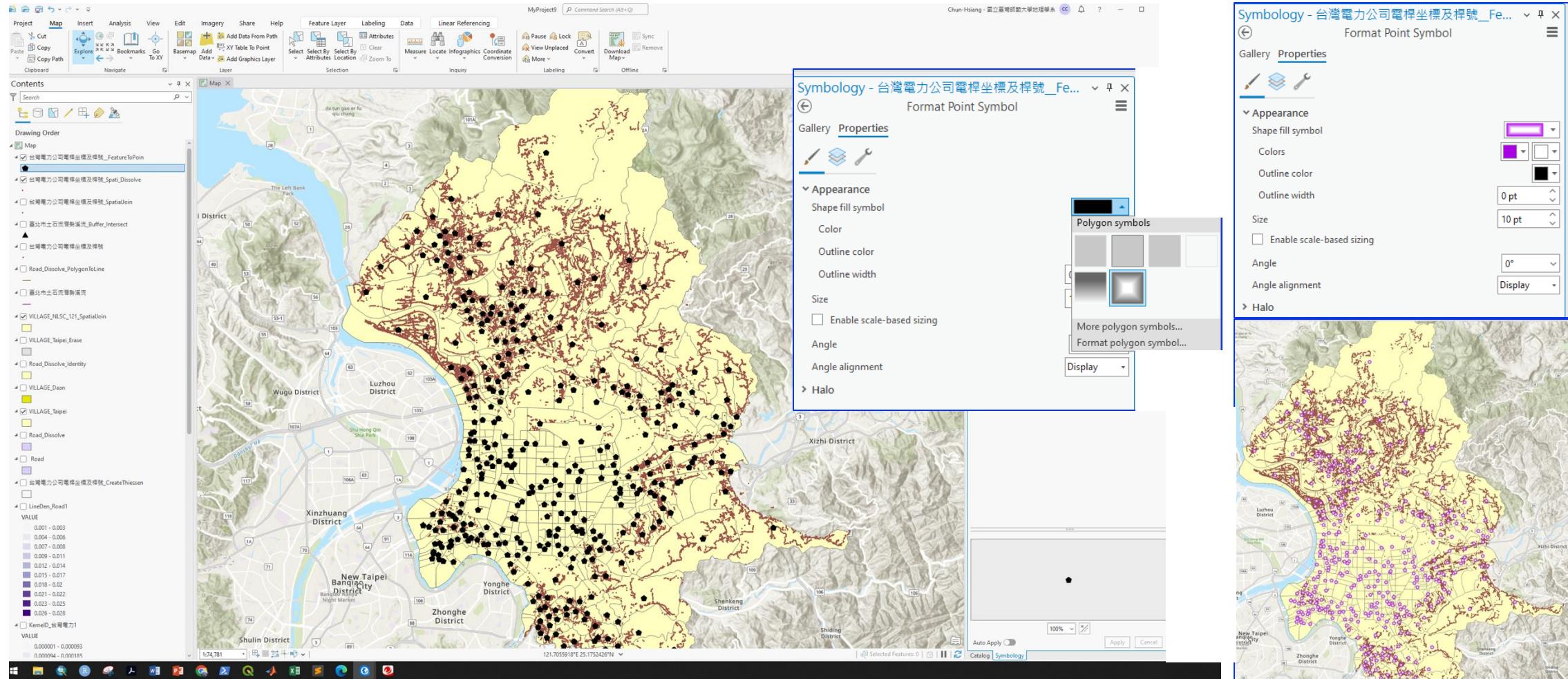
Feature To Point for Converting Dissolved and Spatial Joined UP Layer to Single Point



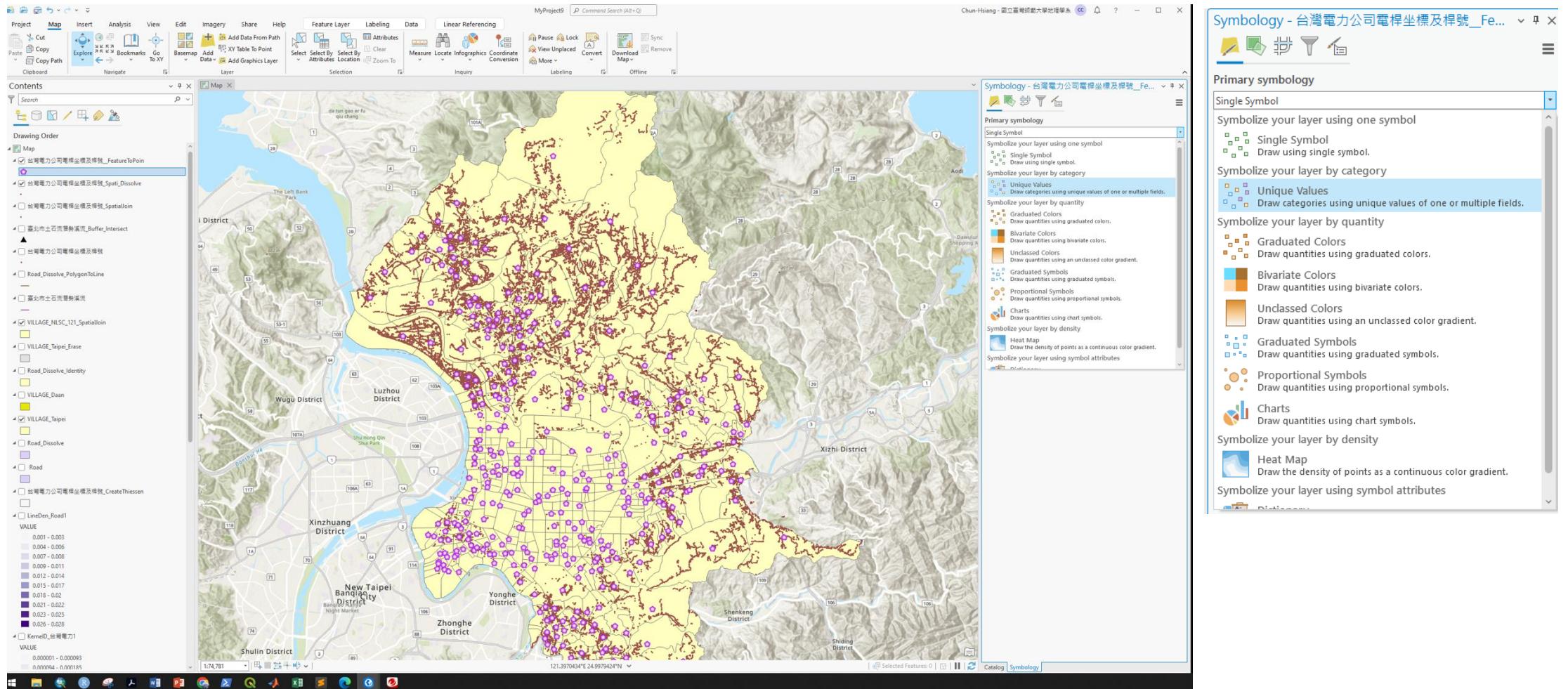
Symbology :: Single Symbols :: Types of Symbols



Symbology :: Single Symbols :: Symbols and Properties



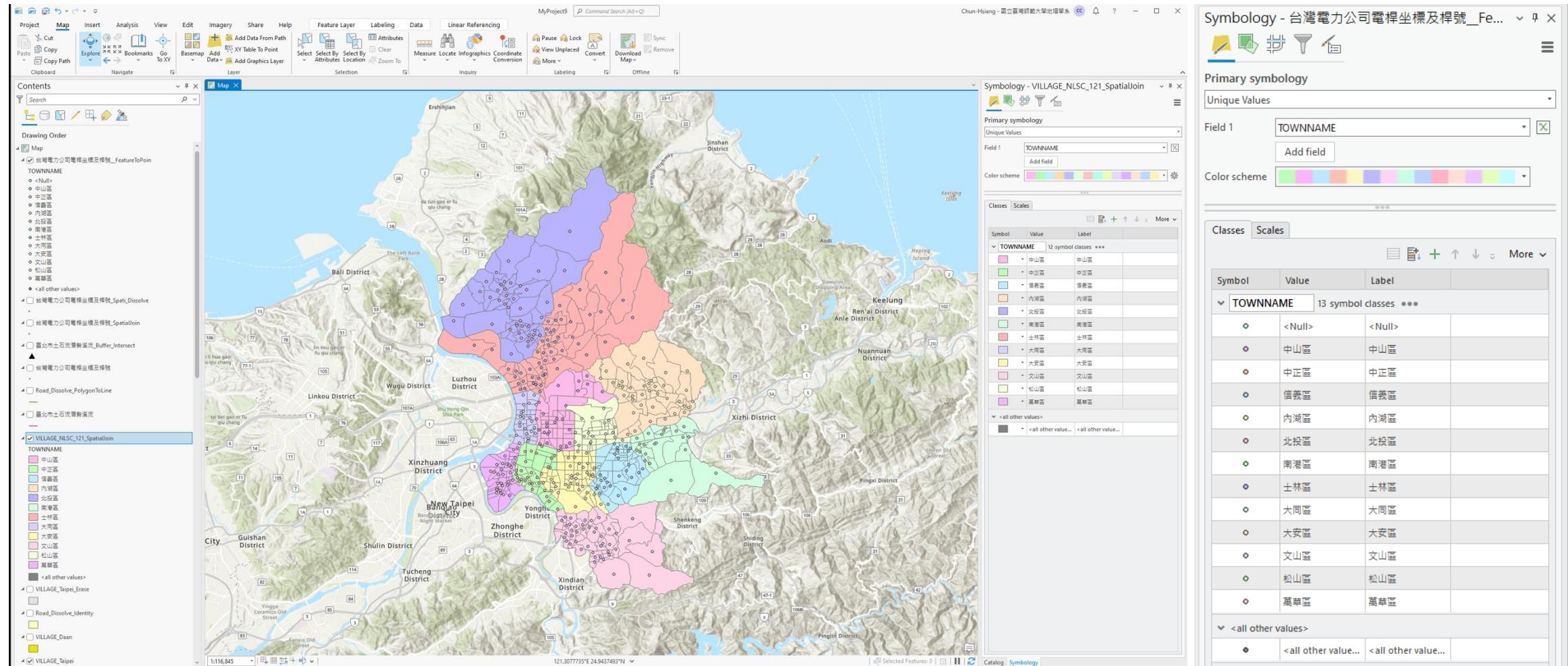
Symbology :: Single Symbol



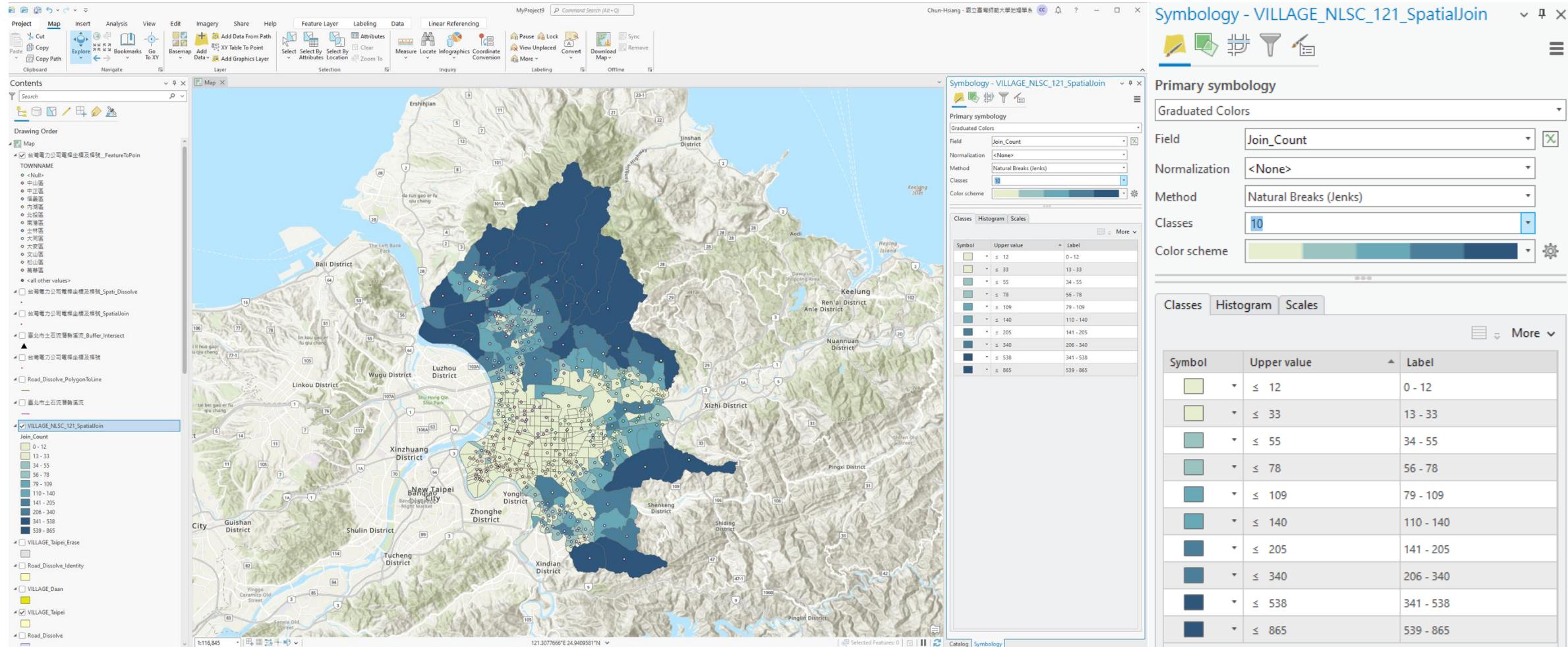
Symbology :: Single Symbol by District

The screenshot displays the ArcGIS Pro interface with a map of Taipei, Taiwan, showing various districts and their boundaries. The districts are uniformly colored in a bright green shade, representing a single symbol applied across the entire area. The map also includes topographic features like roads, rivers, and mountains. On the left, the Contents pane lists several layers, including 'VILLAGE_Taipei_JoinFeatures' which is currently selected. On the right, two symbology galleries are open, one for 'VILLAGE_Taipei_JoinFeatures' and another for 'VILLAGE_Taipei_JoinFeatures'. Both galleries show a grid of symbols for different categories such as Building Footprint, Cemetery, Commercial, Cultural, Education, Government, Health/Medical, Industrial, Land, Landmark/POI, Park, Recreation, Water (area), Airport, and Airport Runway. The 'Single Symbol' option is selected in both galleries.

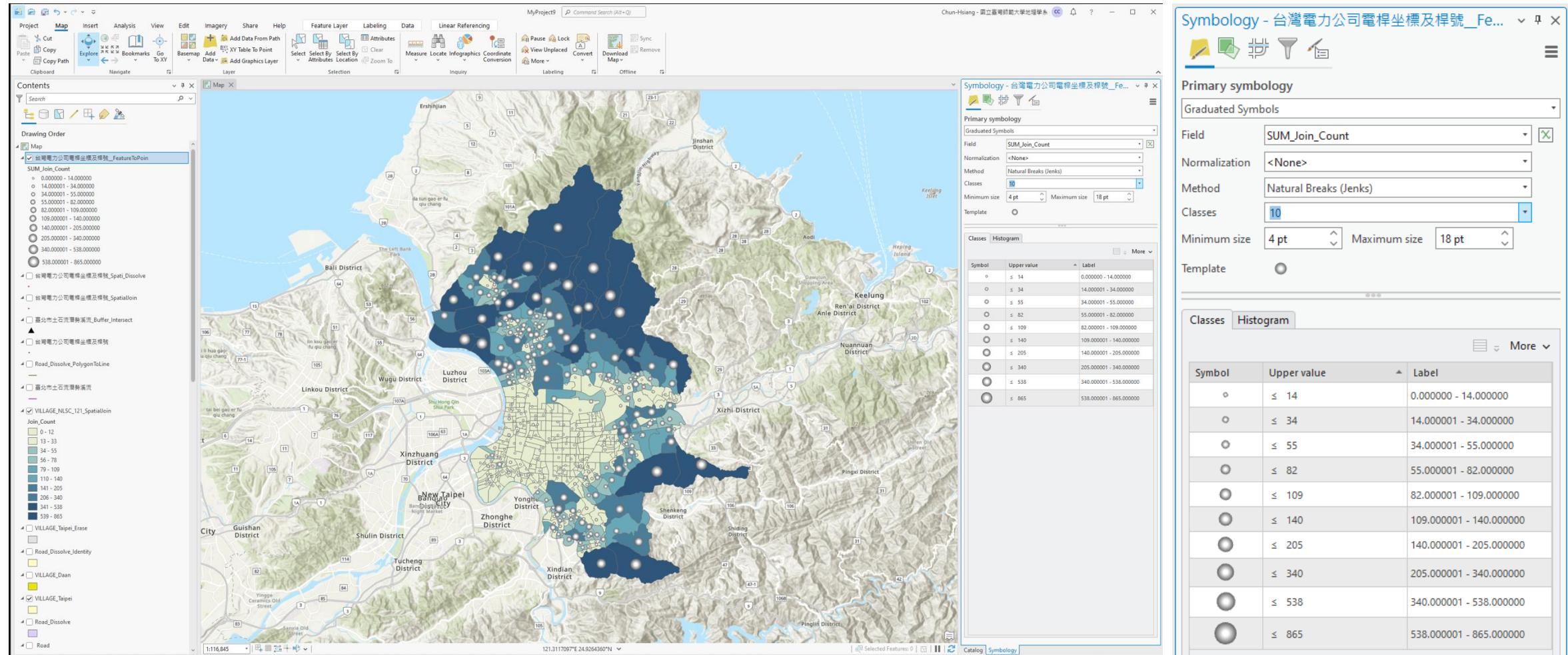
Symbology :: Unique Values by District



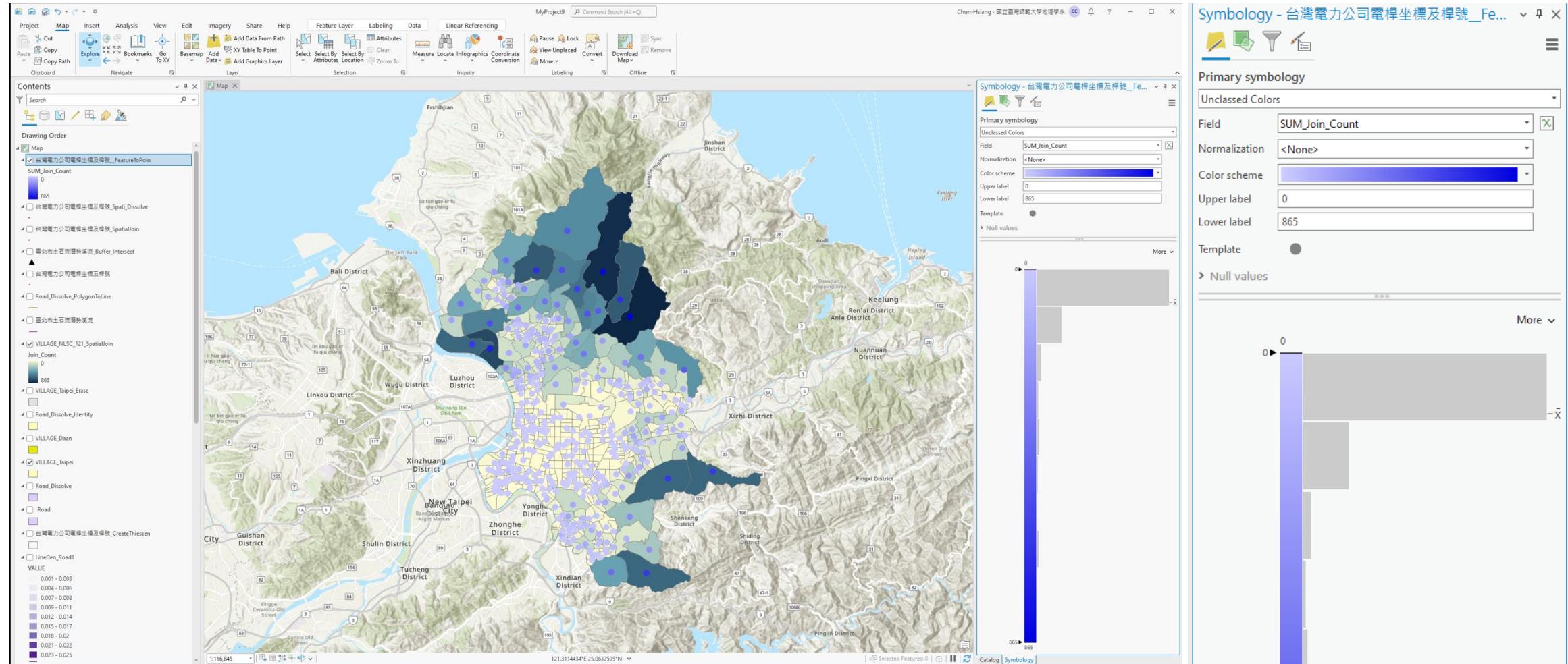
Symbology :: Graduated Colors by UP_CNT



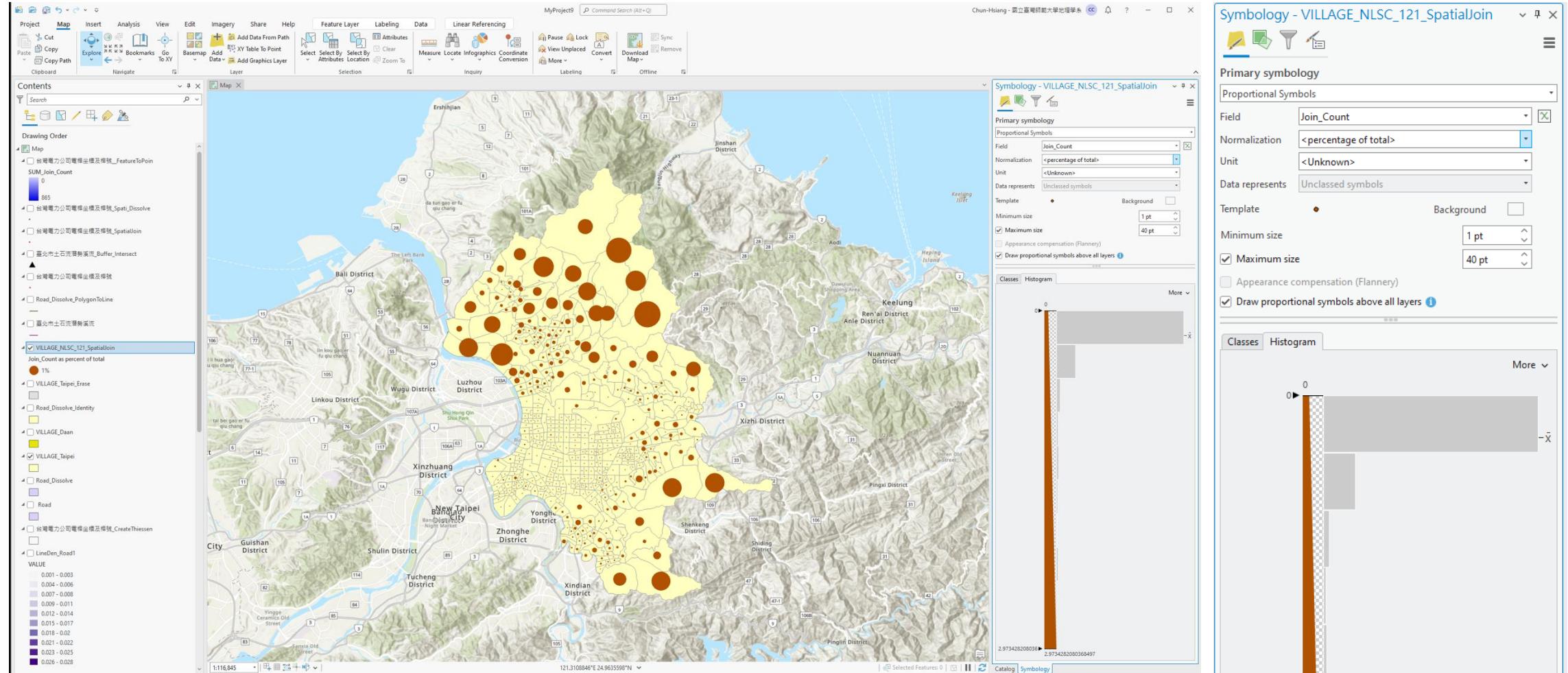
Symbology :: Graduated Symbols by UP_CNT



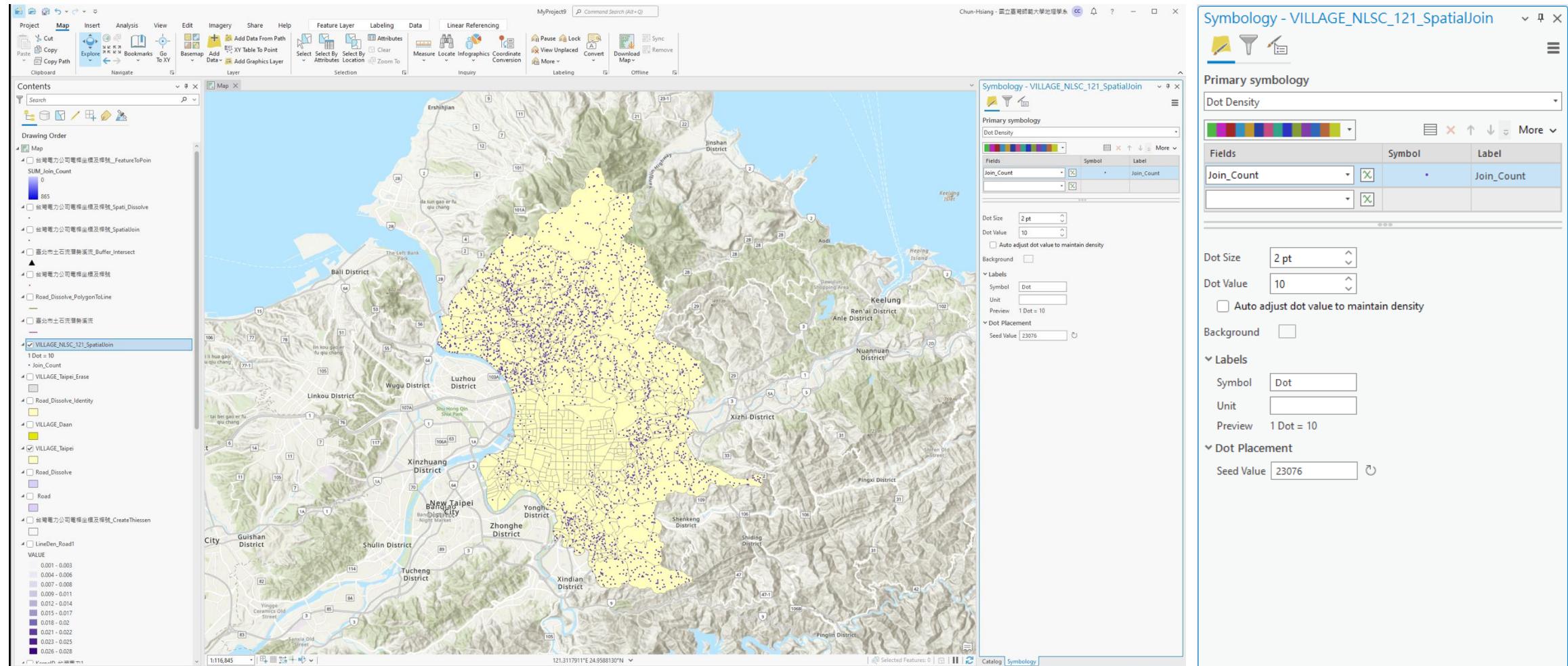
Symbology :: Unclassed Colors with UP_CNT



Symbology :: Proportional Symbols with UP_CNT



Symbology :: Dot Density with UP_CNT



The End

Thank you for your attention!

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